THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LVIII. No. 1475.] LONDON, AUGUST 18, 1891. [43RD YEAR. Price 6d.

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Guaranteed Free from Adulteration. **TORBAY PAINTS.**
FOR GASHOLDERS, &c., &c.
The Original "Torbay Paints"
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See Advertisement, p. 290.

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EARLE'S
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Portland Cement
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Now Ready, Price 6s., bound in Cloth.
THE CHEMISTRY OF ILLUMINATING GAS.
By NORTON H. HUMPHRYS, Assoc. M. Inst. C.E., F.C.S.
The matter composing this book consists mainly of articles written for, and published in, the JOURNAL. The preface says: "In view of new processes that seem to fall in thick and fast one on the other, it has been several times suggested that they should be collected together, so as to form a record of the various gas-making processes that have been proposed in the past, together with some account of the natural laws that govern the manufacture and supply of Illuminating Gas."
The work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation Condensation; and Purification.
LONDON: WALTER KING, 11, BOLT COURT FLEET STREET, E.C.

SELF-CONTAINED DUST-FUEL FURNACE.
MELDRUM'S PATENT.

Extract from the *Smethwick Telephone,* June 13, 1891.

GAS COMMITTEE.

"The Manager [B. W. Smith, Esq.] reported that the adoption of MELDRUM'S PATENT FURNACES, he estimated, had resulted in a saving of 150 tons of Slack during the nine months they had been at work in the Boiler-House, and 360 tons of Slack during four months in the Retort-House; the fuel used in place of slack being the fine coke dust which formerly had to be carted or boated away at considerable expense."

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A Large Stock of Valves always on hand.

Lamp Columns; various patterns.

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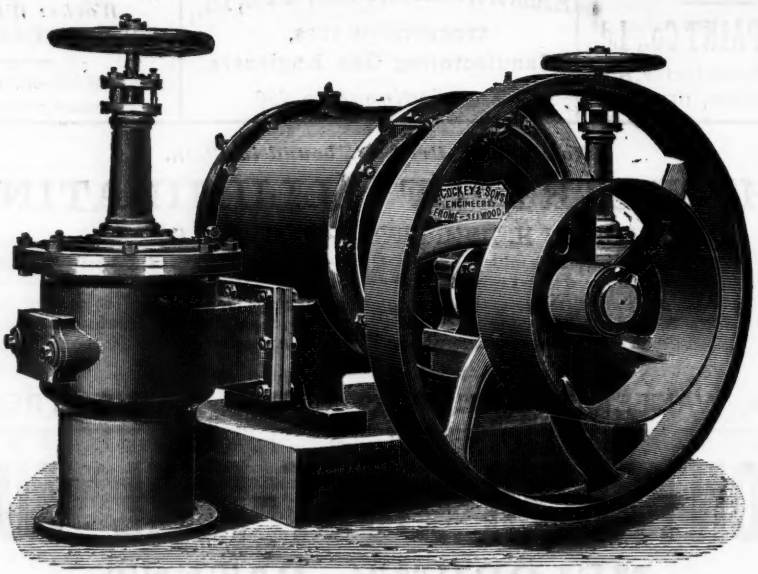

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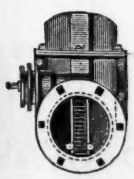

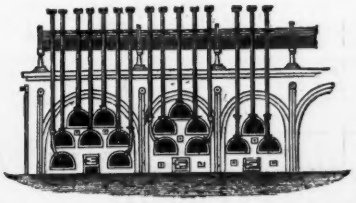

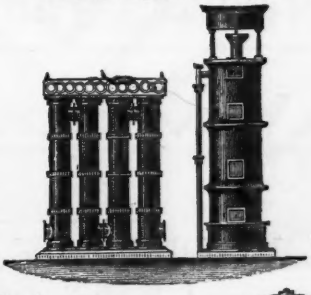

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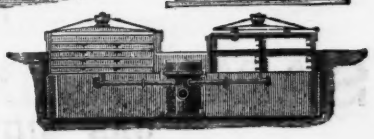

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CROSSLEY'S "OTTO" GAS-ENGINE.

100 Prize Medals.

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GAS-ENGINES
COMBINED
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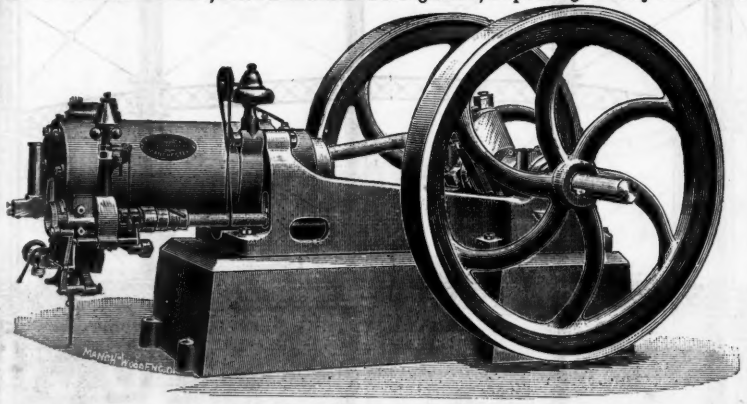
New 14-H.P. Nominal Size, fitted with Patent Tube Ignition, dispensing entirely with Plates.



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Largely used for
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MANUFACTURERS OF
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.
GLAZED BRICKS AND PORCELAIN BATHS.

LEAKY AND STICKING SLIDES
ENTIRELY AVOIDED.

EASILY MANIPULATED.

ESPECIALLY SUITABLE
FOR
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CUTLER'S PATENT
WATER-VALVES
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LEAKAGE
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NEAT AND COMPACT.

NO DETERIORATION THROUGH
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IN USE AT NUMBERS OF LARGE WORKS, AND GIVING GREAT SATISFACTION.

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Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

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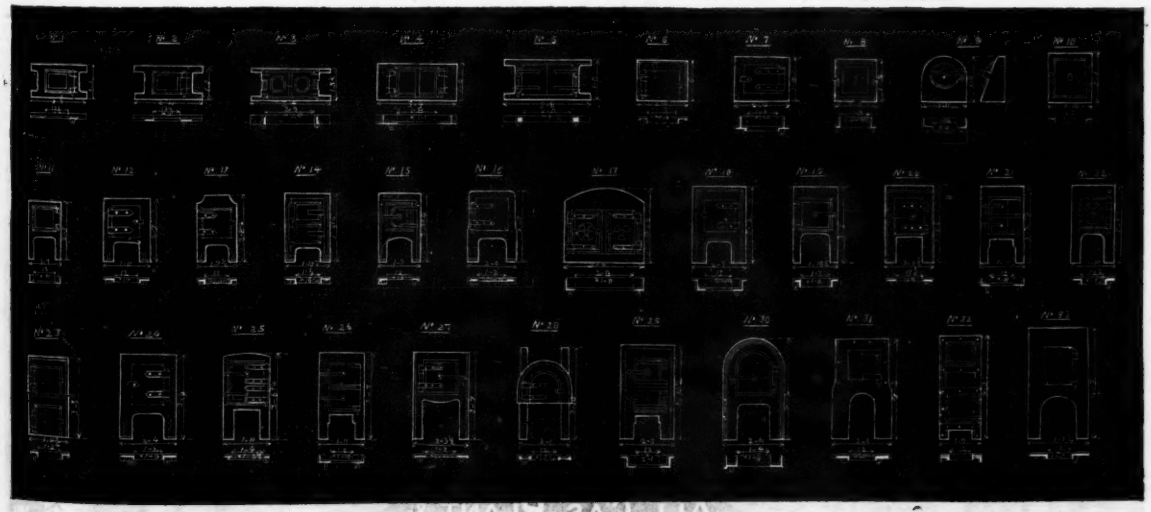

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Furnace Doors and Frames suitable for Generator, Regenerator, and ordinary Retort Furnaces.

MOST OF THE ABOVE DESIGNS CAN BE MADE IN WROUGHT IRON, IF DESIRED.

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The best Stove made for Hiring out purposes. Can be taken to pieces readily.

Richmond's Cast-Iron and Enamel "Model" Gas Range.

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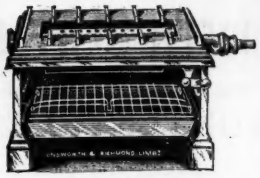
This "Model" Range has been signally successful! So large a demand having been created for it, we have now for the second time in Twelve months enlarged our Works to meet the press of orders.

1.—Its chief advantage for hiring out is: All Oven Fittings, Hot Plate, Hot Plate Burners, Jet Cocks, and Gas Bar, easily removeable for Cleaning.

2.—To the General Public: Clean and neat appearance, Special Simmering Burners, Blue and White Enamel, Hot Plate Burners lift out to clean. No screws. Economical and Simple.

3.—The above points are confirmed by Nelson Gas Committee's test, June 3, in which U. & R's. "Model" Range beat Wilson's, Wright's, Davis's, and three other makers for Roasting, Baking, &c., and won first place against all competitors.



Quick Lever Grill.
No. 200 10×9×7½, 7/-. No. 205 12½×11×8, 10/-

Burners suitable for heavy work.
No. 300 12ft., 2/6. No. 302 16ft., 3/6. No. 304 20ft

As Block. No. 306, 1/8. No. 308, 2/6.
Plain Reeded Rim. No. 313, 1/6. No. 314, 2/6. No. 315, 3/6.

No.	Inside Dimensions of Oven.			Hot Plate.	Height over all.	Burners on Hot Plate.	For family of	Price unpacked.	Packed and Enamelled.
* 30	11in.	11in.	17in.	17½in. × 17½in.	28in.	2	2	£2 10 0	£3 0 0
* 40	13in.	12in.	20½in.	18½in. × 18½in.	28in.	3	4	3 0 0	3 10 0
* 50	13in.	13in.	25in.	18½in. × 18½in.	32in.	3	5	3 10 0	4 0 0
100	14in.	13½in.	28½in.	24in. × 22in.	36in.	4	6		5 15 0
120	16in.	16in.	28½in.	25½in. × 23½in.	36in.	5	10		7 0 0
140	18in.	18in.	28½in.	28in. × 26in.	36in.	6	15		9 0 0
160	22in.	21in.	32in.	31½in. × 30in.	41½in.	7	25 to 30		18 0 0

* These smaller sizes are not fitted with loose Burners at present.

G. J. EVESON,

GAS COAL AND CANNEL CONTRACTOR,

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A SPECIAL COMPOUND

FOR THE CURE OF STOPPED ASCENSION-PIPES,

A couple of charges of which will clear a stopped pipe, and an occasional charge keeps them clean, and also increases the make per ton and the illuminating power.

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SIMPLE IN CONSTRUCTION EFFECTIVE IN RESULTS
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SULPHATE PLANT
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STILLS IN STOCK
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NEW PATENT "STANDARD" WASHER-SCRUBBERS.

The following List comprises the orders received for PATENT "STANDARD" WASHER-SCRUBBERS constructed according to the Company's latest patent, and Renewals effected by the application of same to old Pattern Machines.

NEW PATENT "STANDARD" WASHER-SCRUBBERS.

	Capacity, cub. ft. per 24 hours.
THE GASLIGHT AND COKE COMPANY—	
Kensal Green	3,000,000
,,	3,000,000
Birmingham	5,000,000
West Ham	3,000,000
Liverpool	3,000,000
,,	3,000,000
Rochdale	3,000,000
Manchester	2,500,000
Glasgow	2,500,000
,,	2,500,000
Leicester	2,250,000
Swansea	2,000,000
Derby	1,500,000
,,	1,000,000
Dover	1,000,000
Cambridge	1,000,000
West Bromwich	1,000,000
Warrington	1,000,000
Luton	1,000,000
Valparaiso	600,000
Barry and Cadoxton	500,000
Workington	500,000
Lowestoft	500,000
Atlas Steel Works, Sheffield	250,000
Bangor	250,000
Rawmarsh	200,000
Hitchin	150,000
Melbourne (Victoria)	1,500,000
Altoona, Penn., U.S.A.	750,000
Charlottenburg (Germany)	1,500,000
Magdeburg (Germany)	750,000
Halle (Germany)	600,000
Erfurt (Germany)	400,000
Elberfeld (Germany)	600,000
,, ,,	600,000
Bordeaux (France)	2,000,000
Nice (France)	875,000
Nancy (France)	525,000
,, ,,	525,000
St. Chamond (France)	350,000
Lille (France)	250,000
Baccarat (France)	175,000
Melun (France)	210,000
Barcelona (Spain)	875,000
Valencia (Spain)	875,000
,, ,,	200,000
,, ,,	200,000
Santander (Spain)	350,000
Vercelli (Italy)	200,000
Alger (Algiers)	875,000

RENEWALS.

THE GASLIGHT AND COKE COMPANY—	
Beckton	2,500,000
,,	1,250,000
Nine Elms (in part)	3,000,000
Shoreditch	2,500,000
Pimlico	2,000,000
Bromley	2,000,000
SOUTH METROPOLITAN GAS COMPANY—	
Vauxhall (in part)	3,000,000
Birmingham	5,000,000
Manchester	2,500,000
Plymouth	2,000,000
Croydon	1,500,000
Edinburgh	1,500,000
West Ham	1,500,000
Nottingham	1,500,000
Melbourne (Victoria)	1,500,000
,, ,,	1,500,000
Maidstone	1,000,000
Smethwick	750,000
Kingston-on-Hull	400,000
Weston-super-Mare (in part)	400,000
Enfield	300,000
Harrow	250,000
Buxton	250,000
Leominster	150,000
Kidsgrove	100,000

As a proof of the value of the invention, it may be added that, after an extended trial, The Gaslight and Coke Company have given a second order for the apparatus for their Beckton Works, a third order for two new Washer-Scrubbers, each for 3,000,000 cubic feet of Gas per day, for their Kensal Green Station, and have also adopted the system at their Nine Elms, Shoreditch, and Pimlico Stations (*Vide* List of Orders).

The patent wooden devices are being continually fitted to existing "Standard" Washers where renewals are required, and are made in segmental bundles to fit between the wheel plates, similar to the present iron sheets; and Engineers will at once see that the substitution of the improved wooden devices in place of the indented iron sheets will so very materially prolong the life of the "Standard" Washer-Scrubbers as to warrant the outlay for renewal.

The Company have recently received an order from the Birmingham Corporation for a complete set of these devices for the 5,000,000 cubic feet per day "Standard" Washer-Scrubber erected in the year 1882; also for a duplicate of this Machine (*Vide* List of Orders).

Orders recently advised by United States Agent for Patent "Standard" Washer-Scrubbers as follows: Brookline, Mass., 750,000 cubic feet; H. F. Watson & Co., Erie, Penn., 1,000,000 feet; Taunton, Mass., 300,000 feet; Springfield, Mass., 750,000 feet; Altoona, Penn., 750,000 feet.

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Wet and Dry Meters of every description repaired, altered, and adjusted, at prices which we shall be pleased to furnish on application.

A LARGE STOCK OF METERS ALWAYS READY FOR IMMEDIATE DELIVERY OR SHIPMENT.

Descriptive Price Lists, Estimates, & full particulars forwarded on application.

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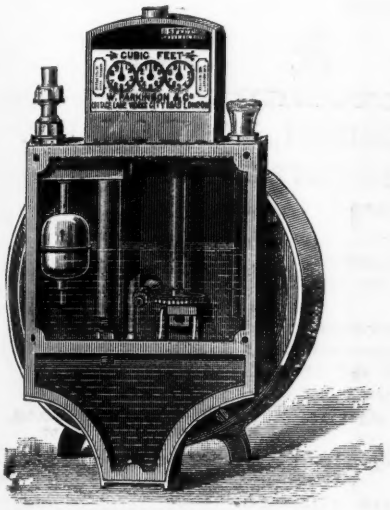
— ESTABLISHED 1816 —

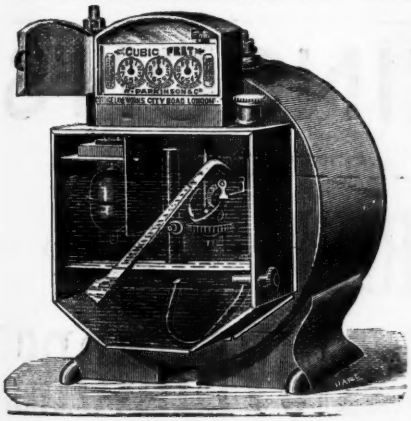
THE ORIGINAL MANUFACTURERS OF WET METERS.



ORDINARY WET METERS

IN CAST-IRON CASES.

Work with very little friction. Will stand very high pressures. Cannot possibly be shut off by sudden increase of pressure, the Float being affected by Outlet Gas only. Allow for loss of water by evaporation without materially affecting the registration or shutting off the gas. Unexcelled for simplicity of construction, excellence of workmanship, or accuracy in registration.



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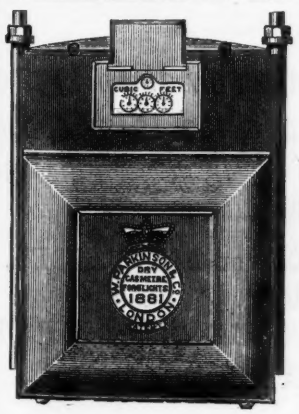

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[See also Advt., p. 294.

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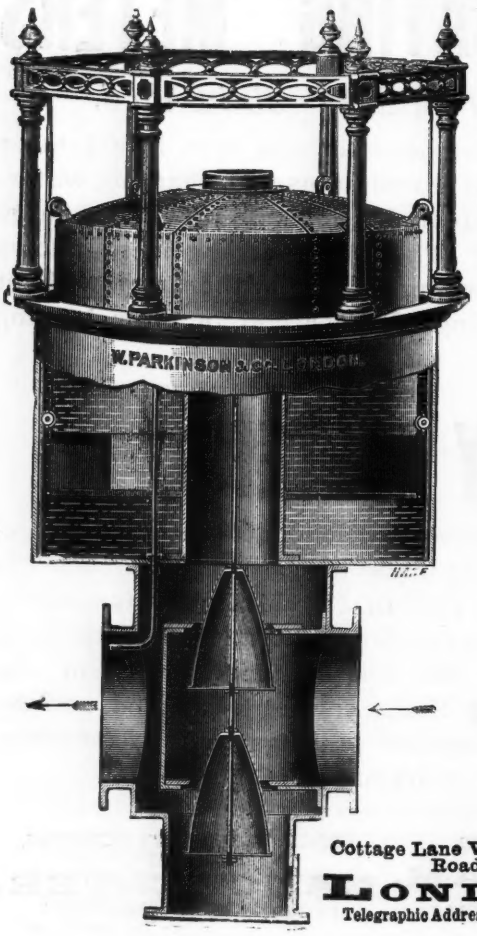

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TO CORRESPONDENTS.

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THE
JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 18, 1891.

The Report and Accounts of the South Metropolitan Gas Company.

THE report and accounts relating to the past half-year's working of the South Metropolitan Gas Company, which we briefly mentioned last week, reveal a mixture of good and evil fortune for the Company and their consumers. The most salient fact of the situation—the decision of the Board to raise the price of gas as from Michaelmas—is, of course, matter for regret, but hardly for surprise. It has been known that the Board have been greatly averse to taking such a step; but they have at length yielded to the force of circumstances. The additional 3d. per 1000 cubic feet will give the Company about £75,000 a year, which, in the improved circumstances now before the undertaking, will restore the balance of its finances. Although the raising of the price of gas is always a step to be deplored, and in the case of the South Metropolitan Company is, we believe, unprecedented—their course having always been in the other direction—yet there are considerations of no small moment which give this instance the aspect of an interesting experiment. We have said that the Company have hitherto progressively reduced the price of gas in their district; and this has been done so often during and since the amalgamation period, that the consumers and local authorities may almost be excused for having taken this operation as a matter of course, and in the light of a natural consequence of the Company's working. The reversal of the process will show the public that cheap gas is a product of good management and favourable circumstances; and that when either or both of these conditions are changed, the effect must also be altered. In the case now under consideration, the management remains the same as before; but the gas supply of South London has been kept up under circumstances the reverse of favourable. A great rebellion in the ranks of labour has been suppressed—effectually and permanently, it may be hoped, but at heavy cost; and the price of coal has increased until every ton purchased cost half as much again as was paid when last the South Metropolitan Company's gas was charged at the price to which it is now proposed to return. Upon the top of all this has come the "improvement" of the testing arrangements under the control of the Referees, who have had their will in the matter of photometers, regardless of the cost of the additional candle power required to satisfy their aspirations. An increase in the price of gas is a wonderfully effective way of summing up these various burdens on the Company. The new condition of things, moreover, will throw into relief the working of the profit-sharing scheme; and the recent allotments of capital stock among the consumers will ensure their ready perception of the compensating character of the sliding scale under which the undertaking is administered.

The most satisfactory feature of the Directors' statement is the steady increase in consumption which they are able to report. This is not attributable solely to the severity of last winter, but was well maintained afterwards, and proceeds from a growing demand for gas for all purposes. Upon the sales of gas for the corresponding half of 1890, the advance is as much as 17½ per cent.; but since at that time the full pressure was not maintained, it would not be fair to dwell too much upon this particular figure as representing so much new business. That there has been a substantial addition of fresh custom is proved in another way, however, by a considerably increased revenue from stove and meter rental. Unfortunately, when coal happens for the time to be exceptionally dear, a sudden increase in the weight carbonized is not altogether desirable. The normal extension of business is profitable to a gas company because of the diminished charges for capital and establishment at which it can be met; but, under the conditions prevalent last winter, the extra profit disappears, even when it does not give place to a calculated loss.

Turning now to the revenue account, it may be noted that the total receipts of the Company for the past half year amounted to £543,738, the details of which are entered in a fashion that exhibits some novelty. Thus the rental for the Lady-day and Midsummer quarters is now separated into two entries, instead of being lumped as of old; the numbers of meters and stoves are given; and the statements respecting the different residuals are set out in more detail. Altogether, the revenue has improved by £78,537. On the other side, manufacturing charges amount to £372,347, as compared with £299,552, or an increase of £72,795. Coals cost £257,669, or 14s. 9·7d. per ton. Carbonizing wages came to £56,507, or a fraction under 3s. 3d. per ton. Both of these figures compare favourably with some of the same character that have been recently published. We are tempted to make a remark here. The South Metropolitan Company have had a strike, which cost them (say) £80,000 in cash to suppress. Their big neighbour, with whom the Gas Workers' Union originated, have had no strike; but it costs them at least 3d. per ton more to get their work done under Union control, and the expense is increasing every half year. At this rate, and since 3d. per ton upon their enormous coal consumption does not fall far short of £30,000 a year, it will not

be long before the Union punishes their cash-box as heavily as it did that of the South Metropolitan Company, with the additional aggravation of being still a thorn in their side; whereas the southern undertaking, by sharp, short surgical treatment, was freed of it. It is true that there is a charge upon the South Metropolitan exchequer of £11,400 for profit-sharing; but this has something of the nature of an insurance premium. It should be noticed, as a novelty, that the cost of coal in this account includes that of 91,000 gallons of petroleum spirit used as a substitute for cannel. The balance carried to the credit of net revenue is £88,682, which is almost exactly the same that was earned at the corresponding season of last year, out of which a portion of the strike expenses was taken. The capital account shows that the undertaking now has to pay dividend and interest on £3,061,066; and by the balance-sheet it appears that the Company hold £22,749 of workmen's savings and bonuses. This is a luminous commentary upon the ravings of the Union agitators, who are so fond of asserting that the bonus scheme has broken down. It is pretty safe to assume that if the Union cash-box was half as well filled, we should never hear the last of it. There is plenty in these accounts to supply Mr. G. Livesey, the Chairman of the Company, with material for an interesting address to-morrow.

The North of Ireland Association Meeting.

THE members of the North of Ireland Association of Gas Managers met last Tuesday in Belfast, under the presidency of Mr. R. Ross, of Dungannon; and a report of the business transacted on the occasion will be found elsewhere. The attendance was good—the place of meeting being accessible by the majority of the members of the Association; and the character of the proceedings was decidedly such as to justify the existence of the organization. The President delivered a suitable address; and two practical papers were read by Messrs. Williamson and Frizelle, both of which elicited discussion. Mr. D. M'Callum, of Omagh, was elected President of the Association for the ensuing year; and Dublin was chosen for the place of the next meeting. Since the selection in this instance lay between Dublin and Omagh, it is no wonder that the capital was chosen; and it is remarked, as perhaps significant of a change of policy on the part of the Association, that it has determined for one occasion to go so far south as Dublin. It would, however, be easy to misunderstand this incident. Neither Dublin nor the South of Ireland has materially helped the Association hitherto; and its stronghold must therefore continue to be in the North. At the same time, the majority of the members hail from small towns; and the railway facilities of Ireland do not lend themselves to the ready concentration of visitors upon any point that might possess local recommendations through being the head-quarters of a President, or otherwise. Hence it is necessary to exercise care in the selection of places of meeting. The Association is doing very well as it is; but, as we have remarked on a previous occasion, it would be a mistake to space the scenes of the periodical gatherings too far apart for the convenience of those members who cannot spare more than a day for attendance. A prominent visitor at the meeting was Mr. W. A. Valon, President of The Gas Institute, who took an important part in the discussion of Mr. Williamson's paper. In thus making himself personally known to members of local Associations, Mr. Valon is following the example of Mr. J. Hepworth, and performing a duty the value of which might have been realized with considerable advantage by his predecessors of a bygone time.

The Leeds Water-Gas Poisoning Case.

IT does not appear to us that sufficient notice has been taken in any of the newspapers of the leading case of *Tennick v. The Leeds Forge Company*—otherwise to be known to future publicists as the Leeds water-gas poisoning case. A report of the hearing by Mr. Justice Day at the Yorkshire Summer Assizes will be found in our "Legal "Intelligence" to-day. The facts are simple enough. The plaintiff sued as the legal representative of the late Henry Tennick, who was killed upon the works of the defendant Company in November, 1889, under circumstances fully reported in the JOURNAL at the time; the action being in the interest of the children of the deceased, for damages for the death of their father. There was no question as to the facts; the only points in dispute being with regard to the bearing of the Employers' Liability Act upon the case, and the amount of damages. The termination of the case was of a character which we will venture to say redounds in the greatest degree to the credit of English jurisprudence, and reflects high honour upon all concerned. There were some points of law touching their responsibility which the Company felt bound, in justice to the shareholders, to contest up to a certain stage; but then, having taken the sense of the Court, they gave way, and consented to a verdict. Judge and Counsel for the parties acted in the matter with that wise benevolence, ruled by the sense of duty to the law of the land, which our Courts have sometimes the opportunity of exhibiting; and, as the result, it is, humanly speaking, assured that the bereaved family will secure without deduction the *solatium* which had been claimed on their behalf. But now let us remark the principle of this affair. Water gas was introduced into the Leeds Forge works for the purposes of the proprietors, without the least reference to the additional risk that was thereby laid upon the Company's servants. If these had declined to work with the new fuel on the ground of extra danger, in all probability the Courts would have condemned them for breaking their contract of service. On the other hand, the Company introduced the unfamiliar fuel at their peril; and they have had to bear the penalty for want of caution in handling it. The lesson is one to be borne in mind. In the United States, where water gas and a good many other dangerous, but convenient, adjuncts to civilization have a vogue which is denied them in older communities, this result has been obtained, in part at least, by reason of the fact that the rights of individuals are less regarded as against corporations than is the case here. From what may be gathered of the practical working of American institutions, it appears to the disinterested observer that corporations in the United States do pretty much as they please, while individuals must get out of the way, look after themselves, or take the consequences. If an "elevated railway" is carried down a street, depreciating the value of all the property therein, no redress is possible. The philosophic Yankee merely accepts the inevitable, and goes elsewhere to retrieve his damaged fortunes. So with coal-gas companies, the change to unmitigated water gas, involving increased risk to life, is made at the undertakers' option; the consumer having nothing to say upon the point. In England, on the contrary, the individual is supreme; and if a Gas Company, for the sake of any business interests of their own, were to subject their consumers to an unwonted risk, the first casualty that could be traced to this cause would be the means of teaching them the moral of the Leeds case.

Cause of the New Unionism.

IT is a remarkable fact that there is much more information about the New Unionism to be gleaned from the ordinary newspapers than can be found in the so-called "Labour" press, which is generally devoted to expositions of the views or advocacy of the claims of some clique of agitators who wish to "live by the altar." This is perhaps the reason why the British Workman usually prefers his halfpenny evening paper, which provides him with a variety of spicy and easy reading as well as the sporting tips in which his unregenerate soul delights, to the dreary productions of Unionist scribes. He can hear Burns and Tillett, and the rest of them, every Sunday afternoon, if he likes; so there is no reason why he should pay a penny extra for their printed counsels. It is, as the wire-pullers find, as difficult to extract the causal penny or the regular twopence from the son of toil for anything which does not greatly interest him, as it is easy for the tipster and the beer seller to drain him of more silver than he ought to spare. John Burns had a meeting of (nominal) gas workers at Battersea last Sunday week, when he was constrained to upbraid his auditory with their shameful reluctance to "deny themselves one pint "of cold fourpenny a week, and pay the twopence to "their Union." Burns is a racy speaker, and generally tickles the ears of his supporters in this style; but this constant begging for the Union treasury sounds bad. Congregations, whether in or out of church, do not like to be "preached at" in this way, as the witty writer whose death the English-speaking race has just deplored—Mr. J. Russell Lowell—pointed out long ago. We are all more prone to listen to, and applaud, an orator who denounces to us the

misdeeds of others, than to love the candid friend who reminds us of our own shortcomings; and there is no evidence that the British workman differs in this regard from the rest of the community. John Burns is not the only agitator who finds it necessary to look after ways and means. The *Trade Unionist* has discovered that the most pressing need of the "cause" is a General Purposes Committee of the Trades Union Congress, composed of three or four members, and an Organizing Committee of similar strength, to undertake what is euphemistically called "missionary and propaganda work," in the interest of the New Unionism. It is not difficult to perceive the meaning of this move. The stock company of agitators want to be endowed. And, besides, they want to keep the stage to themselves. They suffer from the competition of briefless barristers, threadbare Socialists whose opinions are made in Germany, political vote-hunters, and advertising philanthropists. The "bitter cry" of the *Trade Unionist* has arisen; and the poor agitator is to be protected, or Mr. Mann will know the reason why. We thought this would happen sooner or later; and we said so. The state of things revealed in connection with the 'busmen's strike, of every movement of the kind producing its new Regenerator of Labour, was fraught with the gravest danger to the old gang, who were compelled to keep watch lest the notoriety which is their diploma should be stolen from them by new comers yet more leather-lunged than Burns, plausible than Tillett, truculent than Thorne, shifty than Wilson. Consequently, it is not surprising that the Trades Union Congress, which is shortly to assemble in Newcastle, should be asked to create a hierarchy of authorized agitators, who would, we presume be distinguished by some title, and wear some peculiar badge when on duty, to imitate which would be felony. That this inner Union of New Unionists would expect to be paid, instead of being required to pay on their cards, like the common men who work with their hands, is only what might be supposed in the circumstances; and it is an additional evidence of the shrewdness of the promoters of the scheme. It would not be difficult to fill in a list of the names of the chosen ones who would be likely to receive the support of the *Trade Unionist* in this connection; but we forbear. We will only say this about the suggestion—that if the Trades Union Congress provide this clique of agitators with the endowment they are begging for, the Unionist workman will prove himself to be a more hopeless dupe than even those who think most slightingly of his intelligence and independence could have imagined possible.

The Question of Fuel Gas in America.

It is interesting to watch the contemporary development of the fuel-gas idea in the United States. Local conditions are peculiarly favourable to experiments in this direction; but no question of locality can make sixpennyworth of heat go as far as a shillingsworth, even when the currency is dollars and cents; and so the fuel-gas Companies of America are either stillborn or drag out a miserable existence by the forbearance of their bondholders. The action of the Local Authorities of the natural-gas region is a great incentive to fuel-gas schemers. These enterprising bodies are all fiercely competing with one another for the patronage of manufacturers. What with M'Kinleyism and free gas, a mushroom growth of factories for making glass, brushes, watches, and all sorts of goods, has sprung up in certain places; and the authorities of other places want to be similarly blessed. Consequently, they procure natural gas somehow, and offer it, together with other facilities, to manufacturers in search of a location. Having attracted the factories, the next thing is to put a price upon the gas; and in some townships the factory-owners have been asked to pay very much more than enough for their gas to recoup the ingenious authorities for the cost of the bait which attracted them to the spot. Incensed at this sharp practice, the manufacturers have in many instances lent a willing ear to the "process-mongers" who have approached them with offers of oil-gas and water-gas plant. From the successful introduction of fuel gas at a mill to its profitable distribution from a central station, does not appear, at first glance, to be a long step; but it is one that has nowhere been successfully taken. Some interesting information upon this subject was recently collected by a Committee of the Milwaukee Town Council, who were appointed to inquire into the grounds upon which a fuel gas franchise could be issued to local speculators. This Committee visited several places where fuel gas is actually being sold, both for heating and also for lighting by the aid of the magnesian comb or the Welsbach mantle. They heard the same story everywhere—that, so far from there being any economy in making or using non-luminous fuel gas, there is no variety of such gas known to science at present that can compete with ordinary illuminating gas. In more than one town visited by the Milwaukee Committee, exceptional facilities existed for the trial of fuel gas in the shape of spare works and duplicate mains once belonging to a competing Gas Company, and capable of being converted, at nominal expense, into distributing plant for fuel gas. But the result was always the same. If fuel gas was sold at one-half the price of lighting gas, it was only worth half as much; and after a short experience of the trouble of removable combs, &c., few consumers had much to say in favour of the newer kind of illuminant. Consequently, the Committee recommended that Milwaukee should be content to do without fuel gas as a commodity distinct from its ordinary lighting gas, which seems to be fairly satisfactory to the townspeople. The Town Council agreed with the Committee; and so the fuel-gas schemers are desolated once more. This decision goes against the interest of many people; and it is accordingly criticized with much bitterness. But we are satisfied of its substantial accuracy.

WATER AND SANITARY AFFAIRS.

We doubt whether the Seventh International Congress of Hygiene and Demography, held in London last week, has thrown much light on the question of the water supply. The purists have been prominent with their customary teachings; and much that has been said before has been said over again. Among the scientists, Dr. Percy Frankland came forward with a paper referring to "The Present "State of our Knowledge concerning the Self-Purification "of Rivers." In the course of this paper, results were given, obtained by the analysis of various samples of water taken from different points along the course of the Thames; the object being to show whether, on the whole, the chemical quality of the water was improved or deteriorated in the run of the stream from Oxford down to Hampton. So far from the river becoming better as it flowed onward, a "slight, but almost continuous, de-"terioration" was observed, notwithstanding a very considerable increase in volume; a large proportion of the added water being due to springs in the chalk, such as possess "the very highest purity." The analyses were limited to the dissolved organic matter, so as to avoid complications arising from the suspended matters. This being the case, of course we do not get the entire character of the water; and the difference created may be estimated by the statement that concerning the removal of the suspended matters by sedimentation "there is no dispute." In this respect, therefore, the water becomes better as it flows along. The total solid matters in the Thames at Hampton are less in proportion than the quantity observed above Windsor. A similar result is recorded with respect to the degree of hardness. But the total combined nitrogen shows an increase as we descend the stream. Referring to these analyses, Dr. Percy Frankland says: "It will be seen that the idea of any striking destruc-"tion of organic matter during the river's flow, receives no "sort of support from my experiments; the evidence is, in "fact, wholly opposed to any such supposition." But does the learned Doctor mean to say that if a certain amount of pollution enters the river at Oxford, it has such an effect on the water as to make it go from bad to worse all the way down to Hampton? This, too, despite the enormous volume of pure spring water which enters the Thames as it flows along! How is it to be explained that, in respect to its chemical quality, the water undergoes "continuous "deterioration," although slight, as it proceeds on its way? Granting that this result is limited strictly to the dissolved organic matter, still the question arises: How are we to account for the increase? We must suppose that some further pollution has entered the stream. If so, how are we to know, by the time we get to Hampton, what proportion of the combined nitrogen came from Oxford, and how much from Reading and Staines? If the self-purifying power of the

river is to be tested, allowance should be made for the pollutions which enter it on the way. Dr. Percy Frankland admits that the Thames, "after a long flow through a "cultivated and fairly populated district," does undoubtedly often reach London "in a surprisingly pure state." There is the further consideration that the dissolved organic matter "in itself can have no power of communicating "zymotic disease." Whether this matter becomes oxidized or not, is therefore a point of secondary importance. The fact in which we are more directly concerned is the presence of pathogenic microbes. Dr. Percy Frankland considers that "sedimentation" is the main cause of any self-purification in river water; and he refers to a paper which he contributed to the Royal Society in 1885 as showing "to what an astonishing extent micro-organisms "are removed in the subsidence of solid particles." After all, we are thankful to Dr. Percy Frankland for the "sedimentation of microbes," though he warns us that even when these creatures are buried we must not be sure they are dead. He urges us to do our best in purifying all dangerous liquids, such as sewage, before admission into rivers; and in the next place we are "to "submit the water drawn from streams for town supply "to the most careful subsidence and filtration through sand, "before delivery." So far as London is concerned, all this is being done.

Mr. A. R. Binnie, Engineer-in-Chief to the London County Council, believes no water to be good unless it comes from some desolate spot a long way off. Such was the burden of his paper on "Water Supply," read before the Congress. In the course of his argument, Mr. Binnie observed that "there is, perhaps, no better mode of intro-"ducing into the human system any substance which it "can absorb, than by drinking it in the form of a solution." But is the nitrogen in the London Water Supply going to kill anybody? As for the microbes, they are not in solution. In another part of his paper, Mr. Binnie recognizes the doctrine that chemical science "is powerless to detect "the germs of disease," whereas "it can tell us of the "presence of organic matter." The difficulty is with the microbes, or with "the minute spores from which they spring." Mr. Binnie has little faith in sand filtration, although Dr. Percy Frankland has obtained results showing extraordinary efficacy in the filtration practised by the London Water Companies. As for "sedimentation," Mr. Binnie says nothing about it. But he presents a picture of a large population "continually drinking small quantities of "diluted sewage," and thereby preparing their constitutions to receive the germs of some violent epidemic, which he believes is sooner or later to visit the sources of supply. Then, we are told, "will follow such an "outbreak of death and disease as will cause con-"sternation throughout the land." In all this we must presume that Mr. Binnie has London in view. But the inhabitants of the Metropolis are not drinking "diluted "sewage;" neither is it fair to argue as if the water supply had undergone no improvement since 1854. Moreover, why does Mr. Binnie ignore the deep wells in the chalk? By-and-bye he will doubtless present the County Council with a scheme for a remote source of water supply. Then will arise the question whether the present supply is so defective that it is worth while to spend millions of money in order to supersede it. London is not yet sick; and Mr. Binnie's argument that its inhabitants are getting ready to be sick, by imbibing preparatory doses of "diluted "sewage," is a theory which has a certain stamp of originality about it, but which has to face the fact of a marvellously reduced death-rate. According to present appearances, the prophecy of "consternation" may be safely disregarded.

Mr. J. G. Hawkins, of Peterborough, has been appointed Manager of the Spalding Gas-Works, in succession to Mr. John Woodward, who has resigned. There were upwards of fifty applicants for the position.

The Gas, Water, and Electric Lighting Companies' Directory.—We have received from the publishers (Messrs. Hazell, Watson, and Viney, Limited) a copy of the above-named Directory for the current year. The present is the fifteenth annual issue of this useful and comprehensive book; and, as before, it appears under the editorship of Mr. Charles W. Hastings. The usual full particulars in regard to gas and water companies are supplemented by a section devoted to the rating of their works, and to another giving a list of the electric lighting undertakings. The volume includes the "Gas-Works Statistics" and "Water-Works Statistics," which, under the same Editor, have reached their thirteenth and eleventh issues.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 321.)

THINGS, on the whole, were somewhat better in the City last week; and the tone of the markets showed some improvement. Business on the Stock Exchange opened rather dull and featureless, but gave signs of improvement as time went on. Any marked increase of activity, however, or of considerable recovery, could not be looked for at this time of year, when the nature of things is to become more and more quiet. Money continues easy and abundant; but all enterprise is at an end for the present, and there is no demand for it. The Gas Market, too, has been less busy than it was in the preceding week, in obedience to the general influence. The tone, however, has been decidedly good; and, with only one considerable exception, quotations are stronger. This disposition is well marked in all Gaslight and Coke stocks, which are quoted higher *ex div.* Gaslight "A" has risen 2; but the few bargains which were marked showed fairly good figures. Little was done in South Metropolitans; and the changes in price were irregular. "B" fell 4½; and "C" rose 1½. It should, however, be observed that the relative quotations were indicating extreme disparity; "B" being priced to return from ⅝ to ¼ per cent. less for money than either of the two other issues. The report and accounts show that the Company have been doing a very largely increased business; but this has only been effected at a very much greater relative cost, the causes of which are notorious. A sum of about £60,000 will have to be taken out of the reserve fund in order to pay the 13 per cent. dividend; and this necessitates the raising of the price of gas from 2s. 3d. to 2s. 6d. per 1000 cubic feet. The increase may be estimated, upon the basis of the last half-year's business, to bring the Company in about £80,000 per annum; and, as it will not involve a reduction in the rate of dividend paid, there is no cause for the proprietors to feel anxious about their returns. Commercials were steady and quiet. Among Suburbans and Provincials, Brentfords are a little higher. The Bromley Company's report and accounts are satisfactory; showing the large increase of 18 per cent. on their business. Continentals were in good favour; and Imperial Continental improved 2. Oriental shows a recovery, as we pointed out that it should. Monte Video also has improved ½. Business in Water was very dull. Kent rose 2½; but East London fell 2.

The daily operations were: Quiet business on Monday in Gas, with firmness all round. Oriental rose ¼; but Bahia fell 1. East London Water fell 2. Continued inactivity on Tuesday. Prices generally were good; and South Metropolitan "C" rose 1½. There was nothing done on Wednesday, and the tendency was favourable. Imperial Continental improved 2; and Gaslight "A" 1½. But South Metropolitan "B" receded 2. Thursday was quiet, and without special feature. On Friday there was more doing in choice stocks, and prices were well maintained. Things were the same on Saturday—everything fetching good figures except South Metropolitan, of which the "B" relapsed 3.

ELECTRIC LIGHTING MEMORANDA.

The Belfast Report on Electric Lighting Systems—The Cost of Electric Lighting in London—Two Pieces of Financial Information.—The Life of Incandescent Lamps

WHILE so much is being said about technical education, it will not be amiss to draw attention to a variety of this kind of teaching which is very popular in all parts of the kingdom. We allude to the practice of itinerancy by Committees of Municipal Corporations. The pilgrimages made by such bodies in search of information are chronicled in the local newspapers; and the result can hardly fail of being instrumental in spreading knowledge of many things in regions where the people might have gone on sitting in darkness for an indefinite period. The travels of deputations of Municipal bodies may be, and occasionally are, overdone; but when intelligently directed to the attainment of a definite purpose, and composed of the right men, they are undoubtedly of high educational value. What is more, they educate adults, who are the most difficult to teach by ordinary means. These observations are suggested by the proceedings of the Belfast Corporation in the matter of the proposed introduction of electric lighting into the city. The subject was referred to a Sub-Committee of the Gas Committee to investigate and report upon; and this body, having heard much conflicting evidence as to the system of electric lighting which would be most suitable for Belfast, prudently decided to see for themselves how the various systems actually work in the places where they have been tried. They came to London and inspected all the public electric lighting installations to which they could gain access, and their report gives a very clear summary of them all. They formed some very shrewd conclusions from what they learnt in this way, and also from what they could not learn. They report having experienced great difficulty in obtaining definite information as to the cost of the electric current delivered to the consumer; but they quite satisfied themselves that the statutory limit of 8d. per unit will not at first leave much profit, even if it pays expenses, on the scale proposed in Belfast. On account of the absence of accurate details

respecting prime cost and cost of production, the Committee have been unable to make up their minds as to what system to advise for Belfast. After considering this report, the Town Council wisely decided to adopt it as a preliminary statement, and instructed the Committee to continue their consideration of the question, and report again when in a position to do so.

An instructive letter from a West-end householder to the *Pall Mall Gazette* respecting the cost of the electric lighting of his establishment was republished in last week's JOURNAL. This statement deserves to be brought into prominence as a commentary upon Mr. W. H. Preece's claims on behalf of the incandescent electric lamp as being a "poor man's light." This householder—Mr. R. Cook, of 276, Strand—has had the light for two years. At first he was charged a rental of 20s. per annum for an 8-candle power lamp, to be used not over an average of three hours per day. Then the Company introduced a meter system, and declined to supply any more by rental. The result has been to increase the cost of the lighting for something under 100 lamps, to 35s. per annum per lamp. This being his experience of the cost of lighting a place of business, mainly let off as offices, Mr. Cook naturally wonders what becomes of Mr. Preece's fancy that the cost of lighting a private house would only average 8s. 4d. per lamp per annum at the ordinary London rates. Mr. Cook challenges Mr. Preece or anybody else to inspect his accounts; but, of course, the gentleman referred to will be careful to forget Mr. Cook's existence by the time he next speaks in public upon this head. Mr. Cook supports the statement upon the same subject of Mr. Labouchere, M.P. But it will immensely surprise us if the paper-reading electricians, from Mr. Preece downwards, take the slightest notice of these damaging revelations. The public, however, will not forget them.

Two of the most interesting scraps of information which we have gleaned from recently-published financial intelligence relating to the electric lighting industry are, first, that Crompton and Co., Limited, have paid 8 per cent. upon their ordinary shares, and that the Manchester Edison-Swan Company, although paying 5 per cent., have withdrawn £2500 of their capital from local employment and invested it in an Australian Company started by a former manager. The Crompton dividend was not earned by lighting, but by supplying apparatus. The Company, moreover, are addressing themselves to developing electrical traction, especially for mines, for they find that it will not answer to devote themselves to the manufacture of lighting plant alone. And the circumstance that the Manchester Company have to go to Australia to find profitable employment for their money speaks volumes for the contemporary condition of the electric lighting industry in this country.

The JOURNAL was recently the recipient of a very handsome compliment from the *Electrician*, which after referring to us as an "excellent contemporary," went on to describe this column in particular as generally containing "something readable," and stating conclusions which are esteemed as "really creditable," considering the sources of information at our command. When, in addition to all this, our reasoning is conceded to be "always honest," we began to wonder whether our candid critic had a pill to administer, and wished to render it palatable in the time-honoured fashion. But there was nothing of this sort to follow—only an explanation, by way of reply to a query of ours, of why it is that no reliable information is forthcoming as to the cost of incandescent electric lighting in the United Kingdom, including everything. The *Electrician* says that we must wait until the advent of competition in lamp manufacture. "Until then, no arguments can possibly induce the lamp makers to divulge the figures which they alone can accurately give." A computation is offered, however, to show that with Edison-Swan lamps worked in the ordinary way at 4 watts per candle, an average 8-candle power lamp with a life of 1000 hours should cost £1 2s. 5d., taking the charge for energy at 7d. per unit, and the cost of the lamp at 3s. 9d. If 3-watt lamps were used, these would have to last 467 hours to show an equal cost. Our contemporary evidently thinks that as Edison-Swan lamps must be bought for the whole of the United Kingdom for the next two years or so, and these cost 3s. 9d. each, it is useless to trouble consumers further on the point.

Mr. A. Colson and the Beckton Gas-Works.—A Leicester newspaper recently published the statement that the highly esteemed Gas Engineer of the Corporation—Mr. Alfred Colson, M. Inst. C.E.—had been invited to take charge of the Beckton station of The Gaslight and Coke Company, with the prospect of further advancement under the Company. We are informed that the offer was actually made to Mr. Colson, who communicated the fact and stated his consequent action in letters to his Committee. While highly appreciating the compliment paid to him by the Directors of The Gaslight and Coke Company, Mr. Colson informed the Court that, in consideration of the kindness and appreciation he has received from his Committee, and recognizing the responsibility that lies upon him for completing the extension works in progress at the Aylestone Road station, he has felt it to be his duty to remain in Leicester. Mr. Colson's Committee have made a fitting acknowledgment of this devotion of their Engineer. This authoritative explanation of recent circumstances relating to the engineership of Beckton is due to our readers, who may have been misled by the publication of apparently contradictory reports on the subject.

HYGIENE AND DEMOGRAPHY.

THE newspapers were full last week of the transactions of the International Congress of Hygiene and Demography, which was held in London under distinguished patronage, and was extraordinarily well attended. It is stated that upwards of 3000 members were present at the congress, including delegates from all parts of the civilized world; and it was found necessary to divide the business among ten sections. All this comes as a surprise to the majority of the British public, who had little idea that any such gathering was "in the wind;" and there were few newspaper readers who saw the first references to the Congress but experienced a desire to inquire what it was all about. The title of the affair was mysterious; for although people know pretty well by this time what is meant by the term "Hygiene," the word "Demography" came before most Britons as a novelty, to all appearance of foreign manufacture. Inquirers were told that the term means the science of popular statistics; and therewith curiosity had to be satisfied until it could be seen, by the usual medium of newspaper reports, what Demography is like in practice. We know now. After the experience of last week, it is clear that a Congress of Hygiene and Demography is little more than the old Sanitary Institute meeting "writ large," and blended with a revived Social Science gathering. Besides the foreign delegates, the principal performers on this occasion are mostly familiar figures. It is inevitable that this should be the case; for sanitary science, engineering, and statistics are the same things by whatsoever names they may be called; and one can but get the best living authorities to expound the new phases which they present from time to time. All the same, it seems passing strange that the congress-haunting order of scientific persons should be so susceptible to the attraction of a new name. The old Social Science Congress died a natural death, on account of the hopeless dulness of its proceedings. Money could not be found for paying the expenses of a meeting at which a succession of windy bores, pedants, and charlatans advertised themselves and wearied one another, while an uninterested public passed by contemptuous of the whole business. The British Association for the Advancement of Science is going the same way as the Social Science Congress; and the Sanitary Institute is sorely put to it in order to escape the doom that long since overtook the Smoke Abatement Institution. Yet this year an altogether new invention in the class of congresses of the not too scientific kind draws like the most popular of novelties. How is this effect to be accounted for? The older gatherings of scientific and *pseudo*-scientific men died, or are dying, not because the subjects to the consideration of which they were or are devoted are inferior in importance to anything that can be included within the scope of Demography. The study of Social Science was never exhausted by the old National Association, which owed its existence to the interest created by the clever work of Herbert Spencer. Town smoke persists after the society which essayed to abate it has been relegated to obscurity; and natural science is more studied than ever, although the British Association people make more noise by their picnics than by their papers.

It certainly appears, from the evidence in this case, that an itinerant, semi-popular, semi-scientific association cannot retain either popularity or usefulness for an indefinite period. One generation gets into a state of excitement over Social Science, which is an idle cry in the estimation of its successor. Social Science is dead—long live Demography! Sanitary Science fails to charm—let us call it Hygiene. Such is the way of the world. Human nature is very much the same, even when it has become scientific; and as the philosophic populace of Athens were noted for their proneness to run after every new thing, the philosophers of modern Europe are not superior to the fascination of a new name to an old study. The time has passed for the free spawning of new sciences. Fresh developments of old principles are continually being made; but fresh openings for the irradiation of Truth upon thinking mankind, ever working in twilight, come more rarely than of yore, when scientific method was first evolved from traditional blundering. There is an order of scientific men, however, who are not content to do their appointed work in seclusion, or even under the quiet eyes of their fellows in culture. These worthy gentlemen like the publicity of annual congresses; and they do not greatly care what name the meeting bears, so long as it is big enough, and makes enough noise in the world. It is not they who grow tired of the old names; but the public—the newspaper-reading public—who, after a few seasons, turn away from the dull reports of the too familiar societies. Moreover, few semi-popular organizations live long without attracting bores who empty its meetings, and satellites who hang upon it for what they can pick up to their own advantage; and so they perish from the land. A year or two passes; and behold! another social organism fills the vacant place, only to experience the same fate in its turn.

We make these observations upon the Congress of Hygiene and Demography because, as already stated, it only differs in name and in a few points of constitution from extinct species of the family to which it belongs. The subjects of the papers

are perfectly familiar; the Presidents of the different sections, as already observed, are well known. Some of these are worthy of all respect in their vocation; and it would be matter for regret if there were no congenial gatherings at which they might expand their ideas in sympathetic company. Men like Sir Francis Galton and Sir Joseph Fayrer are always sure of an audience. It is only too probable, however, that the time will come when the title "Demography" will be degraded as others have been. We only need a paper on the "Sanitary Aspects of Electric Lighting" to fix the fatal description "commonplace" upon the proceedings of this new organization; and very soon thereafter the congress-loving scientists will need a fresh rallying-point.

Several of the topics dealt with by the Demographers last week are of immediate interest for readers of the JOURNAL. Sir Henry Roscoe, the President of the Section of Chemistry and Physics, delivered an address which, according to a writer in *The Times*, is "marked by a somewhat unusual degree of the not uncommon determination to establish the surpassing efficacy of leather." This is a decidedly cumbrous way of remarking that Sir H. Roscoe, as a chemist, is inclined to take a good deal of credit for the part played by chemistry in the general advancement of sanitary knowledge. The reproach is not unfounded, for chemists are generally prone to exalt their own value to the community; and Sir H. Roscoe is hardly disposed to give enough credit to the authorities, whether medical, biological, or engineering, who have pointed out the directions in which chemistry might be most profitably employed in the service of the community. Chemistry, in fact, is like mathematics in being a sufficient reward to its adepts, who are apt to lose sight of utility in their abstractions; and but for the circumstance that the engineer, for example, lays violent hands on both the chemist and the mathematician when he wants their assistance, there is too much reason to fear that both chemistry and mathematics would soar away into the empyrean. Sir H. Roscoe, however, is not a transcendentalist. He is, on the contrary, one of the most practically-minded of living chemists; and on Tuesday last he soon brought the attention of his hearers down to the subject of the aërial sanitation. He observed that "the great smoke question" is one upon which discussion might be attended with good results. It was, as a matter of fact, treated by Mr. A. E. Fletcher, upon whose paper we may have something more to say. Sir H. Roscoe's contribution to the subject was more suggestive than informing. He said that "much, doubtless, can be done in preventing the output of smoke from factories and other places in which large quantities of coal are burnt. But, after all, the smoky atmosphere of our towns is caused chiefly by the thousands of domestic fires; and at once to alter these so as to prevent smoke, or to insist upon gaseous fuel being used instead of coal, is to expect the impossible." Naturally, after this magisterial statement, a discussion ensued on town fogs and their effects, introduced by Dr. W. J. Russell; but not much came of it.

The comment of *The Times* writer upon this part of Sir H. Roscoe's address is a very reasonable one. He takes the orator's opinion to be that fogs may be ultimately disestablished by the free use of gaseous fuel and electric light, and observes: "No doubt we might thus be freed from fogs of the dirt-laden character with which we are only too familiar; but something more than gaseous fuel and the electric light will be needed in order to overcome the natural results of the position of London on a tidal estuary, bounded for many miles by marshy or low-lying land. We shall have fogs in spite of chemistry; and we shall be more than grateful to Sir H. Roscoe when he or his fellow-workers point out a practical means of freeing the fogs, which are inevitable, from the accidental constitutents by which they are now so largely defiled." This sort of reading is both encouraging and disappointing. It is encouraging, because it shows that perception of the nature of black fogs, and realization of the desirability of getting rid of them, are steadily, if slowly, penetrating from the limited class of sanitary specialists to the larger order of educated people, from whom they must in time reach the mass of the population. It is disappointing, inasmuch as it testifies to the persistence of the old fallacy that deliverance from black fogs is to be waited for until somebody works what, in the present state of science and social economics, would be a miracle, Why cannot the influence of all our newspapers be directed to secure for the people of London and other large centres of population the great boon of immunity from fogs for at least six months of the year? From the experience of a large section of the community, it is certain that, by the help of coke for kitcheners, and gas cooking-stoves, no domestic chimney in the United Kingdom need produce black smoke from May to October. No chemist is wanted to tell us how this may be done; but counsel upon such a subject is beneath the notice of a "leading" newspaper. Yet the smokelessness of the atmosphere of a town, if only for the summer months, would be an enormous boon. Vegetation would be favoured thereby, and the lives of the people brightened beyond belief. Such a reform of the conditions of life in an English town as the smokelessness of its skies all the year round, is not to be expected to come *per saltum*. But let us all, in our several degrees, do what we can to help forward this result with the means that lie actually at hand; and we shall perhaps be as useful in our generation as an orator before a Congress of Hygiene and Demography.

NOTES.

Steam Heating.

A paper on district steam-heating systems was lately read by Dr. Charles E. Emery before the American Society of Civil Engineers, with special reference to the experience of the New York Steam Company, whose plant has now been in regular use for upwards of eight years. The Company have two stations; the mains from one extending through nearly 5½ miles of streets, while from the other about 2½ miles are supplied. All the pipes are of wrought iron—the largest being 16 inches outside diameter; and the pressure is maintained throughout at from 80 to 90 lbs. Engines as well as heating apparatus are served from these mains; and in some instances after the live steam has been used for an electric lighting plant, the exhaust is turned into radiators. Curiously enough, there has been more trouble with the return mains—which have proved a failure—than with the high-pressure pipes and fittings. All the mains were treated in the same way, and similarly protected against corrosion; but the return pipes have been eaten out with rust, while the others remain as good as ever. Without going into details, the conclusion reached is that the carbonic acid in the atmosphere and soil (the principal active agent in inducing corrosion) has a particularly active power at or about the temperature of boiling water. At lower temperatures its action is less violent; and at higher temperatures moisture is at once repelled, so that absolutely no corrosion occurs. The fact that iron corrodes with great rapidity at or about the temperature named, is believed to be unknown to the majority of engineers. It is remarked that although the return pipes of steam-heating systems as used in mills, &c., had been observed to rust more quickly than the accompanying steam-pipes, this general result had not been clearly distinguished from the effects of leakage, expansion and contraction, &c.; and it was therefore left to the experience of the New York Steam Company to establish the general principle now enunciated. The return pipes of this Company ultimately gave so much trouble that it was at last resolved to dispense with them, and discharge the condensed water into the sewers. Where this cannot be done, it is a saving to use brass tubes for the purpose of a return. Dr. Emery claims that steam distribution is both an engineering and a technical success in New York, and that such a service is a great public convenience. He also declares that it would be entirely practicable in some cities to carry out a plan proposed for San Francisco—to use high-pressure steam in the manufacturing and commercial districts, discharging the exhaust into other mains to be led to the residential neighbourhoods, whence the return water would either be discharged into the sewers at a low temperature under proper supervision, or, if water is dear, conveyed to the central station.

The Performance of Cornish Boilers.

In the course of the systematic tests of steam-boilers undertaken by Mr. Bryan Donkin, jun., and Professor Kennedy, F.R.S., an experiment was made upon three Cornish boilers in regular use at the East London Water-Works Company's Old Ford station which may be taken as exemplifying the performance of this class of steam generators when set and worked in good style, without an economizer. The boilers were set side by side; the direction of the draught being through the centre tube, back through the side flues to the front, and then away underneath the shell. The experiment lasted from 8.50 a.m. to 6.50 p.m.; two of the boilers being fairly clean and the other rather dirty. The feed-water was taken from the hot well of the engine; and the furnace gases were sampled periodically at a point in the main flue where the products of combustion of all three furnaces united just before passing the main damper. The fuel used was the standard coal selected by Mr. Donkin for all the experiments. It is practically smokeless. In the present case the firing was done by the ordinary stokers. Each boiler was 30 ft. long and 5 ft. 9 in. diameter, with a single flue 3 ft. 6 in. diameter crossed by three Galloway tubes; the total heating surface of the boiler being 700 square feet. Rather thick fires were kept. The waste gases entered the chimney at a temperature of 485° Fahr. The balance-sheet of the boilers showed that the heat accounted for in the water was 78·3 per cent.; 14 per cent. going away in the furnace gases; and 4·4 per cent. being lost by radiation. The rest is a trifle. The equivalent evaporation per pound of coal as burnt from and at 212° Fahr. was after the rate of 11·4 lbs. of water. The absolute steam pressure maintained was 51·7 lbs. If these results are compared with the data of steam-boiler economy given by Mr. John M'Laren (see "Note" on p. 160 of the current volume), they will be seen to be very much more favourable to the Cornish type of boiler than those given by that authority.

The Ventilation of the Birmingham Law Courts.

The warming and ventilating arrangements of the new Birmingham Law Courts have been specially designed by Mr. Wilson W. Phipson, M. Inst. C. E., and are believed to be an advance upon anything of the kind previously attempted. The architects of the building took great pains to embody Mr. Phipson's requirements in the drawings, with the result that the heating and ventilating details form an integral part of the structure. The work is done by a pair of 50-horse power Galloway boilers, which drive air-compressing engines and pumps.

To every court two distinct steam circuits are led, each with its own valves. One circuit is for heating the court by simple radiation; the coils being evenly disposed for this purpose. The other circuit is for warming the ventilation air in its passage through the chambers, to which it is admitted from the outside. The object of this double heating plant is to ensure that the warming of the courts shall in no way interfere with the warming of the fresh air admitted by the ventilation system—an arrangement which Mr. Phipson contends is absolutely necessary in order to cope with the variable climatic conditions. The fresh air is drawn into the courts by the exhaustion of the vitiated air through shafts opening out from the ceiling; the motive power for inducing the upward current being compressed air discharged from nozzles under a pressure of from 3 to 4 lbs. per square inch. When the nozzles are in full operation, a velocity for the effluent air of from 10 to 12 feet per second is easily maintained in the upcast shafts, which is sufficient to change the air of the apartment five times an hour. The air intakes are provided with water sprays. The temperature of the courts is recorded by pneumatic thermometers, which notify the condition of the interior of the building to the engine-driver in charge, who can modify the ventilating operations at any moment. It remains to be seen whether these arrangements will give more satisfaction in working than the scheme of ventilation of the Law Courts in London, which is a by-word for inefficiency.

The Forthcoming Electrical Exhibition at the Crystal Palace.—The Directors of the Crystal Palace, in deference to the wish of the electrical trade section of the London Chamber of Commerce, have decided to postpone the opening of the Electrical Exhibition from November, 1891, till Jan. 1, 1892.

The Electric Light at Sea.—A remarkable complaint regarding the behaviour of the electric light at sea has been made to the Trinity House by the Shipmasters' Society. The Secretary (Lieutenant Froud) informs the Deputy-Master and Elder Bethren that members of the Society, in active service, passing from the Thames to the sea, and *vice versâ*, have often represented to the Committee the poorness, sometimes invisibility, of electric lights during certain conditions of hazy atmosphere, when the oil lights of lightships and the gas lights of seaside towns have been comparatively bright and distinct. Fault is also found with the intense and blinding effects of such lights as those of the South Foreland on vessels near at hand. The glare of the electric beam is said to cause ships to cast intense shadows, and to produce a phantom-like appearance of hulls, masts, and sails.

The Society of Arts' Albert Medal.—The Prince of Wales recently presented the Albert Medal of the Society of Arts to Mr. W. H. Perkin, F.R.S., "for his discovery of the method of obtaining colouring matter from coal tar—a discovery which led to the establishment of a new and important industry, and to the utilization of large quantities of a previously worthless material;" and likewise to Sir Frederick Abel, K.C.B., F.R.S., "in recognition of the manner in which he has promoted several important classes of the arts and manufactures by the application of chemical science, and especially by his researches in the manufacture of iron and steel, and also in acknowledgment of the great services he has rendered to the State in the provision of improved war material and as Chemist of the War Department." The medal awarded to Mr. Perkin was for the year 1890; that to Sir Frederick Abel was for the present year.

The Congress of Hygiene and Demography.—The Seventh International Congress of Hygiene and Demography was held in London last week. The previous congresses took place in Brussels, Paris, Turin, Geneva, The Hague, and Vienna; the object of the gatherings being to stimulate public interest in the progress of hygiene and "demography," or the life-conditions of communities regarded from a statistical standpoint. The work of the congress was arranged in two Divisions—Hygiene and Demography—the subjects in the former being classed in nine Sections. Those in which our readers are specially interested are Sections V. and VII., which embrace questions bearing upon chemistry, physics, and engineering in relation to hygiene. The Presidents of these Sections were Sir H. E. Roscoe, M.P., F.R.S., and Sir J. Coode, K.C.M.G. The opening meeting took place in St. James's Hall on Monday, when the President—H.R.H. the Prince of Wales—delivered the Inaugural Address. The work of the congress commenced on the following morning, and was continued until yesterday; the meetings of the various Sections being held in the rooms of the Royal and other societies at Burlington House, in those of the University of London, Burlington Gardens, and at the Museum of Geology in Jermyn Street. A number of papers of general interest were read in the two Sections above named; two of the most important being on "Water Supply," by Mr. A. R. Binnie, M. Inst. C.E., Engineer-in-Chief of the London County Council, and by Dr. P. F. Frankland, on "The Present State of Knowledge concerning the Self-Purification of Rivers." These are dealt with elsewhere; and the other papers will be noticed as occasion may serve. In connection with the congress, which was attended by a large number of foreign visitors, arrangements were made for the inspection of works immediately associated with the business of the meeting; among them being the Beckton Gas-Works and several of the stations of the London Water Companies.

TECHNICAL RECORD.

NORTH OF IRELAND ASSOCIATION OF GAS MANAGERS.

Annual Meeting at Belfast.

The Annual Meeting of the above Association took place last Tuesday, in the Council Chamber of the City Hall, Belfast, which was kindly placed at their disposal by the Town Clerk (Mr. S. Black). Mr. R. Ross, of Dungannon (the President), occupied the chair; and there was a good attendance of members. Among the visitors was Mr. W. A. Valon, Assoc. M. Inst. C. E. President of The Incorporated Gas Institute.

Annual Report.

The preliminary routine business having been disposed of,

The Secretary (Mr. J. Whimster, of Armagh) submitted the report of the Committee as follows:—

The Committee, in presenting their annual report, have to congratulate the members on the increasing vitality and popularity of the Association. The membership now numbers 50; and the financial statement presented herewith, as vouched by the Auditor, shows a balance in hand of £11 19s. 2d.

The Committee expected to have a specially attractive programme for the Belfast meeting; but they are sorry that, on account of personal and family affliction, two gentlemen who had promised papers have been obliged, at the last minute, to withdraw—viz., Messrs. Travers, of Cork, and Outon, of Inchicore. However, three papers are forthcoming on subjects of great importance to us all, which should open up discussions at once profitable and interesting.

We shall also have the privilege of inspecting the Belfast Gas-Works, which are well known as one of the best equipped establishments in the United Kingdom, and which contain what, as yet, no other gas-works have—a complete plant for gas purification in closed vessels, on the Claus system.

Your Committee have had a communication from Section C of the Royal Commission on Labour, with regard to witnesses representative of the gas industry; and, on the suggestion of the Committee of the Manchester District Institution of Gas Engineers, they have resolved to co-operate with the other Associations of Gas Managers, so as to take united action in the matter.

According to Rules 25 and 26, three members of the Committee retire now, and are ineligible for immediate re-election. The retiring members are Messrs. Stormonth, Featherstone, and C. W. Mearns.

(Signed) R. Ross, President.
Jas. Whimster, Hon. Sec.

On the motion of Mr. E. Stears (Lisburn), the report was adopted.

Welcome to Mr. Valon.

The President announced that the meeting was honoured with the presence of Mr. W. A. Valon, the President of The Incorporated Gas Institute; and he was sure he was rightly interpreting the wishes of the members in doing honour to a gentleman of such distinction in his profession. He therefore had great pleasure in asking Mr. Valon to take a seat at the President's table.

On complying with the request of the President, Mr. Valon was received with hearty applause.

Admission of New Members.

The Secretary said the meeting was now prepared to receive the names of anyone who might be proposed for admission to the Association. He himself had four gentlemen to propose—three ordinary members, and one extraordinary member. The former were Mr. Hands, of Enniskillen, Mr. Miller, of Cookstown, and Mr. Harrison, of Aughnacloy; and the latter was Mr. E. W. T. Richmond, of Warrington.

Mr. W. S. Stormonth (Coleraine) seconded the proposition, and it was carried.

Election of Office-Bearers.

The Secretary said that the next business was the election of office-bearers for the ensuing year; and he had very great pleasure in proposing that their respected Vice-President—Mr. D. M'Callum, of Omagh—be elected to the position of President for the coming twelve months. They all knew Mr. M'Callum; and they were confident that the interests of the Association would be perfectly safe in his hands.

Mr. T. Frizelle (Holywood) seconded the motion, and it was carried by acclamation.

Mr. M'Callum thanked the members for the honour they had conferred upon him in electing him to be President of the Association. He felt he was not worthy of the position; but he was proud of that evidence of their confidence, and he could assure them that he would do everything in his power to deserve it.

Mr. W. B. Featherstone (Dundalk) next moved that Mr. W. S. Stormonth, of Coleraine, be appointed Vice-President for the ensuing year.

Mr. E. Stears seconded the motion, and it was carried unanimously.

Mr. Stormonth, in thanking the members, said he would do all he could to advance the interests of the Association, and endeavour to give their worthy President all the assistance he was able.

The President said they had now to make an appointment to what was, without doubt, the most important office in connection with the Association—that of Secretary, the duties of which position had been ably discharged since the establishment of the Association by their friend Mr. Whimster. This gentleman

had expressed a desire to be relieved of the office; but he (the President) was sure he was giving utterance to the opinions of the members when he said that they could not afford to part with their Secretary. They were deeply sensible of the value of his services; and they hoped he would continue to give them the benefit of his energy, ability, and experience. There was no member of the Association who could discharge the duties of Secretary so satisfactorily as Mr. Whimster; and he was sure that gentleman's re-appointment would be hailed with pleasure by all.

Mr. D. Williamson (Ballibay) endorsed all the remarks made by the President with regard to Mr. Whimster's valuable services to the Association, and said he had great pleasure in moving that he be re-elected to the position of Secretary for the ensuing year.

Mr. D. M'Callum seconded the motion, which was passed amid applause.

Mr. Whimster assured the members that he was very much obliged to them for this renewal of their confidence in him, and for the honour they had conferred upon him in again electing him to the position of Secretary of the Association. At the same time he thought some other member of the Association should think of taking the office, and relieving him of the manifold duties which it entailed. He, however, had no hesitation in devoting himself to the work, because he liked it, and he was desirous of doing everything in his power to advance the interests and promote the prosperity of the Association. He was sure the members would forgive him if he said he thought they should consider the Secretary a little more when he was appealing for papers to be read at their annual conference, and for a larger attendance at meetings of Committee. He hoped that, when re-electing him, they would all decide in the future to make his duties as light, and his position as pleasant as possible. There were now to be filled up three vacancies on the Committee, caused by the retirement of Mr. W. S. Stormonth, Mr. W. B. Featherstone, and Mr. C. W. Mearns, who were not eligible for immediate re-election.

Mr. Stormonth proposed that Mr. J. Nisbet, of Portadown, Mr. C. Todhunter, of Ballymena, and Mr. W. Walker, of Hillsborough, be elected to fill the vacancies.

Mr. D. Williamson seconded the motion.

Mr. Richmond thought they should have upon the Committee some representatives of the more remote districts, as he believed that in this way they would strengthen the Association, and widen the interest taken in its operations. He was glad to see present on that occasion two gentlemen from the West—Mr. P. J. Salmon, of Galway, and Mr. C. B. Tully, of Sligo—and he proposed that they should be elected members of the Committee.

Mr. M. Martin (Drogheda) seconded the motion.

The President said they had now before them five names for the three vacancies, and he would take a poll.

Mr. A. Waddell (Newtownards) suggested that the five should be elected.

The Secretary said this was not possible, as the number of the Committee was fixed by the rules of the Association, and they could not now elect more than three.

Mr. Richmond desired to explain that he was unaware of the number being limited. If he had known this, he would not have nominated anyone.

Mr. Salmon, while thanking the gentleman who had been good enough to nominate him, thought, under all the circumstances, it better that he should withdraw. Galway was a good distance off; and the difficulty of communication would prove a great drawback. He believed it was better, in the interests of the Association, that the members of the Committee should be close together.

Mr. Featherstone also thought they should have someone from the West on the Committee; and for this reason he would support the election of Mr. Salmon. It was the desire of the members to make the Committee as wide and general in its character as possible, and so avoid giving it the appearance of a clique. The Association was now, to a certain extent, a Northern Association; but they hoped soon to take in their southern brethren, and make it what they all desired it to be—namely, to all intents and purposes an Irish Association.

The Secretary said no doubt Mr. Salmon resided a long distance away; but it would be the endeavour of the Committee to save him and other gentlemen so situated as much trouble as possible, by having as few Committee meetings as they could. They tried to transact their business, as far as practicable, by correspondence; and therefore the distance need not stand in the way of Mr. Salmon's acceptance of a position on the Committee.

Mr. Salmon said that, under the circumstances, he was quite willing to act; and he thanked the gentleman who had proposed him.

Mr. Williamson thought they might be able to arrive at something in the shape of a compromise; and with this view he proposed that Mr. Salmon, Mr. Todhunter, and Mr. Walker should be elected to fill the vacancies.

The President said this proposal left out Mr. Tully.

Mr. Tully thanked the gentleman who had proposed him, but said he was not in the North, and did not look upon himself as belonging to the North of Ireland Association, properly speaking. In addition to this, the great distance he had to travel would prevent his attending the meetings of the Committee. Under these circumstances, he considered it better that he should withdraw his name. There was one remark, however, that he wished to take the opportunity of making, and it was that, in his opinion, the Association should not continue under its present designation. He thought it should be changed into a general Association, with an approporiate title, such as "The Irish Association of Gas Managers," which would embrace the whole country; and that the annual meetings should be in Dublin.

The Secretary remarked that this question had already been fully discussed, with the result of which the members were all aware; and he did not see that any good was to be gained by re-opening it then.

Mr. Featherstone said the Secretary was perfectly right in what he had stated. The question of the name of the Association had been well discussed; and the members did not see their way to changing the name.

Mr. T. Frizelle pointed out that the question of the title of the Association was not before the meeting; and he therefore called upon the President to rule the discussion out of order.

The President agreed that the discussion was irrelevant; and he therefore submitted the suggestion of Mr. Williamson, that Mr. Salmon, Mr. Todhunter, and Mr. Walker should be elected to fill the vacancies on the Committee.

This was unanimously agreed to.

The Secretary then proposed that Mr. E. Stears should be re-elected to the position of Auditor; and the proposition was carried.

Place of Next Meeting.

Mr. Featherstone moved that the next meeting should be held in Dublin.

Mr. Tully seconded the motion.

The proposition gave rise to a discussion, in the course of which the towns of Omagh, Drogheda, and Portadown were suggested. Eventually, however, a show of hands was taken between Dublin and Omagh; and the result was in favour of the metropolis by a large majority.

The President then delivered the following

Inaugural Address.

Gentlemen,—In addressing you for the first time as your President, I would make it my duty at the outset to thank you for the great honour you have conferred upon me, in a more emphatic manner than I felt able to do at the last meeting, when you elected me to this office. I can assure you of my high appreciation of your kindness. But I am not unmindful of the responsibilities and obligations attaching to the position. It is not an easy thing, in these days of Association meetings, to prepare an address to practical men which shall contain any matter that has not already been rendered devoid of interest by its familiarity. This is especially difficult when the individual upon whom the presidential office is conferred is one whose time is completely occupied by the ordinary routine of gas-works management, and to whom little opportunity is afforded for making experiments, or for carrying out in practice those ideas of improvement which may have suggested themselves to his mind. I must therefore crave your indulgence if, in the course of my address, I am only able to deal with generalities, and do not present any new thing to your view, or throw more light upon topics which are now engaging the attention of the members of our profession. I promise to be brief, for two reasons—first, because I have nothing in the way of special novelty to bring before your notice; secondly, because we have an excellent programme to get through.

Although we have no fixed rule to the effect, it is gradually becoming the custom of Associations to hold their meetings at the place where the President for the time being may happen to be Manager. I should have been pleased to have followed in the wake of my predecessors, and to have welcomed you to Dungannon. But seeing that some of the members at our last meeting, in Newry, stated that "it was a round-about way to Dungannon," and preferred to have the meeting in Belfast, I cheerfully submitted to their better judgment. I allow that Belfast holds out more inducements to visit than my own town; and I hope we shall enjoy the day's outing.

I am glad to be able to say that, financially and numerically, our Association is improving; our membership numbering 52. But though our progress has been marked and satisfactory, much improvement ought, in my opinion, still to manifest itself. There are many managers of small gas-works in the North of Ireland, who, from some cause or another, do not join us. I occasionally hear the statement that the managers of small gas-works need not trouble themselves about Associations, and the like. There could not be a greater mistake. The importance of lighting any town with gas cannot be measured by the size or extent of the place; and it is advisable that the gas supply of a small town should be as scientifically conducted as is supposed to be the case in the larger and more important ones. And is it not a fact that many of the managers of small works indulge the hope that some day their labours may be carried on in a more extensive field? With a view to fitting themselves for such extended work, I cannot conceive anything more desirable than that they should join our Association and contribute papers, giving all their difficulties and experiences, and

noting carefully the discussions thereon, all of which will very materially assist them in their work. It is the desire of your Committee that the Association should be thoroughly representative; that it should be able to extend its assistance and usefulness to the managers of the very smallest works; and that they should, in return, add to the strength of the society by co-operating in all its various undertakings. Less than thirty years ago it was difficult, and considered to be a favour, for a manager of gas-works to be allowed to inspect the works of a neighbouring manager. Each one fancied himself to be the repository of a secret committed to his charge—a secret which was in almost every instance sacredly kept; and on each gas-works gate was the notice: "No admittance except on business." But, thanks to this and other kindred Associations which have been formed, this exclusiveness has been entirely done away with; and wherever we go, we now find inspection of works easy, and good feeling prevailing. These Association meetings afford gas managers the means of knowing what others are doing. Inquiries for information receive proper and full answers; and mental memoranda are made of successes and failures. To the manager of small gas-works, therefore, these organizations are invaluable and indispensable, inasmuch as, owing to the size of his works, he is precluded from testing many of the new patents and processes in this age of invention. At meetings similar to these, he comes in contact with some of his brethren in the profession, and is able to make their experiences his own.

The gas industry is steadily growing, and capital in gas-works is being largely added to. The "hue-and-cry" of the electric light has apparently helped to establish more firmly the financial position of town and provincial gas companies. It caused gas men to be up and doing. But the struggle is not over; for we shall again and again have some new and special form of electric lighting brought to the front by inventors and promoters. At present we have in the North and West of Ireland about eight or ten towns—some of no great magnitude—which are about to adopt the electric light. Our endeavours must continue in the direction of supplying the best article at the lowest possible cost; for, in the long run, consumers will weigh the different forms of lighting in the scale of, "Which is the cheapest?" and the system that answers this question most satisfactorily will be the one adopted. No doubt the electric light has a very great future; but this future will not interfere with the extension of the gas industry. And as in 1878 the cry was, "Electricity will be the light of the future," so now, in 1891, the cry is the same—it is still to be "the light of the future." It seems to me that, in the end, the electric light will be found to have been of service to gas companies rather than the reverse. On the one hand, a needed stimulus has been given to the improvement of the apparatus for burning gas; and, on the other hand, there has been created a demand for improved light, which we are in a condition to supply. The residents in large towns and cities especially will no longer be content with the modicum of street lighting which was considered quite satisfactory before the era of electric light experiments. Let the public be made aware that it is the local authorities, and not the gas companies, who are responsible for the street lighting, and that it rests with the former whether it shall be good or defective. The gas companies can supply light to any extent that may be ordered and paid for. No reasonable effort should be spared to secure the good-will of the general body of consumers. Since writing the above, I observe that the electric light has been introduced into Carlow by Messrs. J. E. H. Gordon and Co. The same Company have obtained the contract for lighting Larne; and water is to be the motive power. Of course, we shall have our eyes on Carlow, in order to see whether or not it will be more successful than Dundalk. I also notice that the same firm have obtained a contract from the Portadown Town Commissioners to light several of the leading streets in that town. The electric light seems, therefore, to be advancing. Well, be it so. There is room enough for both it and gas; and I am not, and never was, the least doubtful that gas would still "forge ahead," and its consumption increase.

It appears, from practical working, that there is not much to be derived from the Dinsmore process; and the various trials have proved to be a costly experiment to several parties. The only proper test I have heard of was in Liverpool, where they erected special plant for its trial—in fact, a complete gas-works, where they could carbonize 8 tons of coal per day—and handed it over to the Dinsmore Company, with coal of their own choosing, to do with it as they pleased. The Liverpool Gas Company paid all expenses; the only stipulation being that the gas should be tested by the statutory flat-flame burner, as used for testing all the Liverpool gas. The result was a failure; showing that there is nothing in the Dinsmore process that cannot be obtained by carbonizing coal in the ordinary way. When I first heard of the working of the process, through Mr. Isaac Carr, of Widnes, I had great hope of being able to dispense with cannel coal, and keep up the illuminating power of the gas to about 20 candles. But after the trial at Liverpool, my hope was blighted. All the trials of the process before it was tested at Liverpool were simply conducted in benches where only one oven or perhaps two were utilized for the purpose. Therefore nothing definite could be arrived at until complete plant was erected, as at Liverpool, and tested as it ought to be, by itself. The result has been a collapse. From information I have obtained, the cost of the settings of the Dinsmore process, utilizing all old materials, is about three times that of ordinary settings, besides the royalty of £2 per mouthpiece. As Mr. Mearns, of Banbridge, has had a bed of four retorts set on the Dinsmore plan, which was in use during the greater part of last winter, and has now another bed of the same number set on this system, which will be in use in the coming winter, he will have ample means, in the two ovens, of making all the gas required for his consumers, and will be in a position by next summer to say what are its merits or demerits. I was anxious that he should read a paper at this meeting, stating his opinions, and giving an account of the working of the process as he found it during the past winter; but he declined to do so. However, after another winter's trial of the process entirely by itself, he will be able to judge as to how far it bears out the assertions of its votaries; and he may then be induced to give us the benefit of his experience.

Inclined retorts seem to be coming to the front; and I believe all works of any magnitude will ere long adopt this system in part or entirely. The system has already been in use at Nine Elms, and Southall (London), Birkenhead, Burnley, Rochdale, and elsewhere. Of course, these are all large works; and I do not think the system will be of much benefit for small ones, as the first cost is considerable. The increase in the cost of manual labour in the carbonizing department opens up a field for the introduction of inclined retorts in large works.

We now hear very little about water gas; but only a year ago we were led to believe, from reports issued by the British Water-Gas Syndicate, that the manufacture of coal gas was doomed, and that water gas alone would shortly be adopted everywhere. An arrangement was entered into between the Water-Gas Syndicate and the Corporation of Harrogate to test the system. The experiment was to continue for three months; but before the expiration of this time, the plant and lamps were suddenly removed. A great many reasons for doing this were given; but as to which of these, or any other reasons, is correct, the public are still in the dark. Of course, people can easily understand how it was that the experiment was tried at Harrogate, when they are made aware that Mr. Samson Fox, who is the moving spirit of the Syndicate, is, or was, Mayor of that borough. So that water gas has amounted to nothing, as far as lighting is concerned up to now. I have no doubt that there is a field open for the gas otherwise than for illumination whatever its projectors may do in the future.

It goes without saying that in most manufactories the price of the raw material governs the balance of profit; and a gas factory is no exception to the rule. Coal and cannel must be bought, and gas made, under all circumstances and at all times, whether it is produced at coal-famine rates or the reverse; and however deeply convinced a manager may be of the policy of supplying cheap gas, and however desirous he may be of doing so, present conditions are certainly not favourable to it. We have within the last twelve months experienced an unexpected rise in the price of coal and cannel—in the former to the extent of 3s. and 4s. per ton, and in the latter as much as 12s. and 13s. per ton; and the manufacturing cost of gas increased at once by about 1s. to 1s. 6d. per 1000 cubic feet, while the value of our residual products has not been enhanced. Consequently, the value of this extra charge falls upon the undertaking; and the question is, Will coal maintain the high price at which it stands? Probably we shall see some reduction in the cost. But there are no present appearances which warrant us in expecting a return of the rates which prevailed two or three years ago; and I believe some other means must be adopted, by those companies who are obliged to send out 20-candle gas to their customers, to bring it up to this standard, than the use of cannel coal. What a comfort it would be just now to those who are struggling under heavy cannel prices, if they could begin with confidence to use in a practical manner oil as a substitute. I believe Mr. Foulis, of Glasgow, as well as others, has been experimenting in this direction for some time; but, so far as I can learn, nothing has yet been advantageously arrived at. In my case, we have to use a certain percentage of cannel in order to have our gas of about 20-candle power; and the cannel which we could purchase, delivered free on trucks in Belfast, two or three years ago at about 18s. 6d. per ton, is this year 32s. 6d., or an advance of something like 95 per cent. Cannel coal masters are quite independent as to home orders, seeing that they have on hand more than twelve months' orders from the Continent and abroad for all they can raise. Retorts and brick and fire-clay goods of all kinds have considerably risen in price. These immense charges bear heavily on gas-works, especially those requiring a considerable percentage of cannel or other enricher; and large companies have had to resort to appliances for more economically handling material and producing gas.

It may be said that the easiest way out of the difficulty is to at once raise the price of gas to such a figure as will cover our diminished receipts; and were we to follow the example recently set by one or two of the largest gas undertakings, I fear such increase would soon become general. I am of opinion that this is the very last step a gas company should take, and that, before the charge is put up, every other method to popularize the use of gas and residual products, and thereby augment the consumption and the company's revenue, and enable them to meet their additional liabilities, should be

resorted to. I would also draw upon the reserve fund and the floating balances, when available; and would in every possible way utilize all resources before raising the price to the consumer, as I believe an increased price not only means diminished consumption, but, in these days of keen competition, it would give our competitors an advantage of which they would not be slow to avail themselves. But, on the other hand, I doubt if the public desire gas companies to keep their price so low that the margin of profit would not enable them to pay their shareholders a reasonable dividend. No doubt people want cheap gas; and I think no one will deny the fact that, for some years past, they have, in the majority of cases, had it. Should, however, circumstances, such as an advance in the price of coal, labour, and material, over which gas companies have no control, place them in the position of having reduced profits that will not enable them to pay their shareholders' dividends, and it is clearly put to the public that, before asking the consumers to bear any portion of this enhanced cost, they had utilized all the resources at their command, I believe the public would pay, with as good a grace as possible, any small additional charge which it might be found necessary to make.

Other important rivals to coal gas are the various oils now consumed for lighting and heating purposes by a large number of householders, who prefer to use these dangerous materials, through which so many lives are sacrificed, either by explosion or careless handling. With oil at 7d. or 8d. per gallon, and the immense variety of elegant, useful, and cheap lamps now to be obtained, one cannot wonder at its popularity with the working classes, while so many obstacles to the use of gas stand in their way. We have also instances of town commissioners, when they cannot get gas for less than cost price from the local gas companies, immediately resorting to the use of oil-lamps for street illumination. But these have invariably proved to be miserable failures. The popularity of gas can only be maintained and increased so long as we can prove to our customers that it is not only cheapest, but most convenient for artificial lighting and heating.

Prepayment meters have not gained popularity with the class of consumers they were intended to benefit. They must require a great deal of attention. The consumers argue that the gas is costing them from 1s. to 1s. 2d. per week, in place of 4d. to 6d. for oil; and they do not appreciate the better and safer light. Several people have not worked the handle of the meter properly; and they have therefore lost their pennies—vowing vengeance on the meter, in consequence.

The Claus system of purification in closed vessels, as in use in Belfast, has not been fully successful; and though no information has been given publicly, it has oozed out that the plant erected was incompetent to purify entirely the large quantity of gas required to be dealt with. I believe they have been altering the plant during the summer, and possibly after another winter we may be able to hear that purifying gas in closed vessels has been a success.

An element of a disturbing character is to be found in the unsettled relations between employers and their workmen; and several gas-works have been directly affected thereby. But in the district covered by this Association, there are a large number of small works, so that the labour question is not of such vital personal interest as it is on the other side of the Channel. Yet the infection is catching, and it may spread. I hope, however, in the interest of capital and labour alike, some method of settling such industrial disputes may be adopted other than strikes, of which, during the past year or two, we have had so many deplorable examples. I trust the Royal Commission which is now sitting to inquire into the whole labour question will adopt a method which will provide for the arrangement of labour disputes without having recourse to open rupture.

In passing, I may just mention that the South Metropolitan Gas Company, of London, are about to put up a gasholder which, when finished, will be the largest in the world. It is to be in six lifts, and will be capable of containing 12 million cubic feet of gas. I think there is great boldness displayed in erecting a holder of such dimensions; and, personally, I would give it a wide berth during a hurricane.

I would recommend those managers who wish to open a field for the sale of sulphate of ammonia to carefully peruse the paper read at the last meeting of The Gas Institute by Mr. T. N. Ritson, of Jersey,* as it is a most interesting and useful contribution to the literature of the subject.

I think I must have pretty nearly exhausted your patience, while travelling over these well-worn tracks; and therefore I will now close. While I must congratulate you on the growing strength of the Association, I fear our Secretary has some difficulty in procuring papers for discussion at our meetings. I wish there was less diffidence among our members in coming forward with subjects. What is required is not so much a long paper, taking up a considerable amount of time in its preparation, but merely the introduction of some of those points of interest connected with our business which are calculated to lead to friendly discussion. We should be learners—gladly welcoming every help, and respecting every personality. But we should also respect our own, and bear in mind that, though the wide Universe is full of good, no grain of nourishing corn can come to us but through the labour we bestow on the plot of ground which is given to us to work. To undervalue our own thought because it is ours—to depreciate our own powers or faculties because some one else's are more ingenious—to shrink from doing what we can because we think we can do so little—is to hinder our own development and the progress of the world; for it is only by exercise that any faculty is strengthened, and only by each one putting his shoulder to the wheel that the world moves and humanity advances.

And now, gentlemen, in conclusion, I have only to thank you for having so patiently listened to these desultory remarks. I only hope the papers to be submitted to you may meet with full, frank, and courteous discussion, so that the chief object of our meeting to-day may be realized—namely, improvement in the knowledge and practice of our profession by the mutual interchange of experience.

Mr. Stears said he thought the members were deeply indebted to the President for his elaborate and interesting address. It was an eminently practical and profitable one—containing many valuable hints and interesting details; and he therefore had great pleasure in moving that a hearty vote of thanks be accorded to him.

Mr. Featherstone seconded the proposition, which was carried by acclamation.

The President briefly expressed his acknowledgments.

Mr. D. Williamson (Ballibay) then read the following paper:—

SHOULD THE SUPPLY OF GAS BE IN THE HANDS OF COMPANIES OR CORPORATIONS?

Mr. President and Gentlemen,—The subject I have chosen is one which I think is worthy of the consideration of every gas manufacturer and consumer, more especially if it can be made clear, by its intelligent discussion, that the public can be supplied with gas more economically by the service being in the hands of one or the other body. I think, therefore, that the question comes naturally within the scope of an Association like ours; and in a meeting such as this, at which representatives of both classes of proprietors are present, it can be discussed from the two standpoints. Seeing that, as gas managers, the interests of the consumers are ours quite as much as those of the proprietors, I believe the discussion will be an impartial one. I may say that I have never heard the subject debated; and for this reason I have attempted to bring my own ideas on the matter before you now, though in a rough and very imperfect manner; trusting that a thoroughly exhaustive investigation may be the result.

At the outset, I must say that my own views on the question are very decided. I have thought a great deal about it, and am fully convinced that it would be to the advantage of consumers generally to have the gas supply under the control of the existing local authorities, or, perhaps still better, county boards. I am a believer in a minimum of capital with a maximum of shareholders; for I hold that the greater the number of shareholders, the greater the sympathy in any concern. Now, I need not say that this would be fully realized if the gas-works were transferred from companies to local or county boards. I do not wish it to be understood that I find fault with gas companies generally, for I do not. I believe that they have served their customers fairly well; at the same time, I think that local or county boards could do it better.

It is said that there are £130,000,000 sterling sunk in the gas-works of England, Wales, Scotland, and Ireland. It is computed that £30,000,000 of this capital is under the control of corporations; leaving the remaining £100,000,000 in the hands of companies. Now, if we look over the returns given in the "Gas and Water Companies' Directory," we find that the dividends paid by gas companies to their shareholders are: In England, from 2½ to 17 per cent.; in Wales, from 2½ to 12 per cent.; in Scotland, from 2½ to 15 per cent.; and in Ireland, from 2½ to 10½ per cent. It would seem from these figures that, of British Gas Companies, those in Ireland yield the smallest return to their shareholders; and I think I shall be pretty near the mark if I assume the average dividend paid in that country to gas shareholders to be 6 per cent.

It is well known that local boards can borrow money from Government at a much lower rate than even 5 per cent., which rate covers not merely the interest, but the repayment of the principal in a certain number of years. If we take it at 5 per cent., £100,000,000 at 6 per cent. would be £6,000,000. Now, supposing all these works were bought by the local or county boards at this full amount of capital of £100,000,000, borrowed thus, and repayable in a certain number of years at 5 per cent., there would be a net saving of £1,000,000, which could go towards reducing the price of gas. There would also be the advantage that at the end of the given period the works would be the property of the boards, free of annual charge.

To explain more fully my meaning, I will take a small works in Ireland with a paid-up capital of £2000, at 6 per cent. dividend, which would be £120. Supposing this was purchased by the local or county board at the full amount of £2000, repayable at 5 per cent., there would be a net gain of £20 per annum for the stipulated number of years over which the repayments of the loan would extend, and the additional saving of the £100 a year besides. But I shall now content myself

* See Journal for June 30 last (p. 1304).

with looking at the immediate saving of £20. There would then be no need for the services of a secretary or collector, for this duty could be transferred to the clerk and collector of the board; and I should estimate a net gain of £15 on this account. Directors' fees would also be saved—say, £15; which would make a total of £50 at least in favour of the transfer. I take the receipts for gas from such works at £500 per annum (there may be some more, but I am sure there are some less). This would show a saving equal to about 10 per cent. of the gas receipts; and if the price were 6s. 8d. per 1000 cubic feet, it would allow of a net reduction of at least 8d.

One great advantage arising from the transfer would be that all the ratepayers in the place, either directly or indirectly, would be shareholders in the concern; and this would have a tendency to increase the consumption of gas. This is much wanted in all our small towns; as, of course, the limited number of the consumers, and the small extent to which they use gas, prevent it being supplied at a cheap rate, especially in inland places, where carriage is such a heavy item in the expenditure. Another advantage would be that there would be fewer, if indeed there were any, of those unpleasant disputes with which I am sure that some of you are acquainted. Under the present conditions, it too often happens that town commissioners complain that the gas company charge far too high a price for the gas supplied to the public lamps; and they demand a reduction. Sometimes they go so far as to name their own price; thus intimating that they consider they know the directors' business better than they do themselves—a proceeding which generally ends in a rupture, and the gas being cut off from the public lamps and oil substituted. Truly a miserable change! I have known this to be done for at least three seasons, to the great displeasure of the ratepayers. But, of course, they then returned to gas. I need not say that this would not occur if the change I advocate took place.

The next consideration is how this transfer of property is to be accomplished. This is a difficulty in connection with the subject which I confess my inability to solve; but I will give you my idea, and leave it to more competent authorities to complete. Perhaps some will say that the law as it now exists is quite sufficient. I think it is not; and for this reason: It seems to me to be a piece of very rough and slow legal machinery, which is compulsory on one side only; for, if I mistake not, while it compels gas companies to sell, it does not compel local boards to buy. What I think is required is a short Bill, to be called (say) the "Gas Companies' Compulsory Transfer Bill;" or a clause for the purpose might be inserted in a County Council Bill.

Then with reference to the price that should be paid to the companies, I would say: Give them not more than 20s., perhaps less, for every £1 of paid-up capital that is sunk in the concern. Someone may remark that this would be treating the gas shareholders unfairly; as they are receiving a good dividend for their money. My reply is: They are not entitled to more than a fair return for their money; and if they receive a large dividend, they should not do so, for the company ought rather to reduce the price of gas and give their customers encouragement to extend its use for other purposes than illumination—such as for heating, cooking, &c.

There is a further benefit which I think would arise if the county boards had the gas-works transferred to them, and that is, that the boards could purchase, under one contract, all the coal, &c., required for the different works under their control. Thus the small works would be supplied with as good material as the large ones, and at the same rate. This, I think, would be an undisputed benefit, especially to small places.

It may be urged that I am not justified in asking the farmers of a country to be responsible in any way for a guarantee for something that is only in the interests of those who reside in towns. My reply is: "What is sauce for the goose is sauce for the gander." The farmers are no more entitled to ask the ratepayers of a town to be responsible for a guarantee for the repayment of their holdings. Therefore, the course I propose would be asking nothing more from country ratepayers than they already receive from town ratepayers; and I think there is nothing unfair in this. But some may say that only consumers of gas would be benefited by the change. I reply that most certainly consumers of gas would be benefited by it; but I contend that every ratepayer would be benefited as well. They would do so in two ways. First of all the streets would be much better lighted at a lower cost for gas; secondly, they would have the advantage of the works becoming their property, free of charge, at the end of the period for repayment; and then the gas could be supplied at a cheaper rate.

I have endeavoured, in my own rough and imperfect manner, to show you that gas can be sold at a lower price, by at least 3d. to 8d. per 1000 cubic feet, by the change of control of the different works from companies to local or county authorities. I hope this will soon be an accomplished fact; for I believe that gas should be supplied at the lowest possible price consistent with the keeping of the works in proper repair. In fact, I would say that it should be sold like any other commodity that is dependent on a fluctuating market for its raw material. I mean that if coal is bought at a low price, the charge for gas should be correspondingly low; if the price of coal rises, that of gas should be raised accordingly for the time. The price should always be regulated in proportion to the cost of coal, labour, &c.; and I have no hesitation in saying that local or county boards could do this with much less difficulty than a company would experience. I need not say that it is a pleasure to give notice of a reduction; but the very reverse is the case when an increase has to be intimated.

These are my views in regard to the proper parties to have the control of the gas supply of the country; and if I have said anything that will arouse an expression of opinion, adverse or otherwise, I shall be pleased to hear it, either in this meeting or anywhere else. I really think gas consumers all over the country should consider this matter, as they would all be benefited by the change I propose. You are all aware that it is in the hands of the ratepayers to make a general transfer of gas-works to local authorities an accomplished fact, as it is they who would be benefited thereby.

Having the utmost faith in the proposal I have made, I hope we shall soon see it carried out. If this were done, it would have a tendency to equalize the price of gas all over the country. If any of you go to the trouble of looking into the statistics bearing upon the matter, you will be much surprised to see the great difference in the price charged for gas in towns which are about equal in size and position. I will give you a very few places I have grouped together in this way, and you will observe the disparity. The works in these towns all belong to Companies, except two (marked with a *), which are owned by private parties:—

Town.	Tons of Coal Used.	Price Charged.	Difference.
Omagh	—	5/-	1/3
Tipperary	—	6/3	
Banbridge	800	3/9 to 4/7	3/9 to 2/11
*Mullingar	800	7/6	
Monaghan	550	5/10	0/8
*Enniskillen	800	6/6	
Donaghadee	115	5/-	2/11
Ballyshannon	120	7/11	
Galway	1,600	4/9	0/8
Sligo	1,700	5/5	

Now, a glance at the map of Ireland will show that each two of the places I have grouped are pretty nearly similar in size and position, and yet there is a great difference in the price charged for gas, especially in the cases of Banbridge and Mullingar, and Donaghadee and Ballyshannon. I think that such a difference should not exist; and I believe that if the supply were in the hands of the local or county authorities of those towns, it would not exist. Again, in looking over the Directory already alluded to, I was surprised to see that so few gas-works in Ireland are under the control of local boards. I think there are only about seven or eight in the whole of Ireland in the hands of these bodies. So I have taken a few of them and compared their prices:—

Town.	Proprietor.	Tons of Coal Used.	Price Charged.	Difference.
Bandon	Commissioners	700	5/-	1/3
Carlow	Company	700	6/3	
Coleraine	Commissioners	1,200	4/2	10d.
Queenstown	Company	1,530	5/-	
Newtownards	Commissioners	943	4/2 to 4/7	1/3 to 10d.
New Ross	Company	900	5/5	
Youghal	Commissioners	705	5/-	2/6
Ennis	Company	760	7/6	
Newry	Commissioners	3,115	4/2	6d.
Waterford	Company	4,278	4/8*	
Belfast	Corporation	91,926	2/9†	9d. to 1/3
Dublin	Company	117,614	3/6 to 4/0	

* Net. † Less discounts up to 20 per cent.

From these figures, I think you will see that what I have endeavoured to prove is a reality, so far as regards the price charged for gas in those places which are under the control of the local authorities. When compared with places of about the same size and position under the control of companies, I am sure you will agree with me that, if Belfast can supply gas at so low a price, that of Dublin should surely not be so high, especially since the Dublin Company, according to the figures given, carbonize 25,688 tons of coal more than the Belfast Corporation. But I think this difference is caused by the change of ownership in Belfast from a Company to the Corporation. I consider that the ratepayers are very much indebted to the Corporation for their forethought in the purchase of the gas-works; and that Mr. Stelfox and his subordinates are worthy of the thanks of all the gas consumers in the city for their economical management of the gas-works, when they can be supplied with gas at so low a rate as that which I have given. Of course, there is only one Belfast in Ireland. But I believe if the principle adopted there were carried out all over the country, it would result in a benefit to the gas consumers generally of from 3d. to 8d. per 1000 cubic feet. So that I think consumers should look to this for their own advantage; for they would certainly effect an immediate saving, as I have said, of 10 per cent. or more on their gas accounts.

I have endeavoured to place before you, in a simple way, my views on this question, supported by facts and figures which I believe to be indisputable; and I shall be pleased to hear you all express your opinions on the matter. I know that you will not all agree with me in my conclusions; but a healthy discussion will do good. For my own part, I have the greatest faith in the benefit that would result if my ideas concerning the gas supply of Ireland were to become accomplished facts.

Discussion.

The PRESIDENT said Mr. Williamson had placed the Association under a debt of gratitude by preparing and reading so admirable a paper. The subject treated was one that he (the President) had never heard dealt with before. The speaker had put his views before the members in an able manner; and he was sure the subject would give rise to a useful and profitable discussion.

Mr. FEATHERSTONE suggested that the views of Mr. Valon, from his position as President of The Gas Institute, would prove interesting to the meeting.

The PRESIDENT said the members would be delighted to hear Mr. Valon, if he would be good enough to address them.

Mr. VALON said he had not expected that he would be asked to speak at the meeting; but he would be glad of the opportunity of making a few remarks upon the subject dealt with in Mr. Williamson's paper. However, in order to be in a better position to do so, he would like to postpone his observations till those who desired to discuss the question had placed their views before the members.

Mr. SALMON expressed his admiration of the manner in which Mr. Williamson had treated his subject; but said he could not agree with him in the conclusions at which he had arrived. In his opinion, consumers were far safer in the hands of a company carrying on their business under the watchful care and supervision of town commissioners or a corporation, than they were when the gas-works were managed by these authorities. He thought the consumers were much more fairly treated by a company than by a corporation, because, in the case of the latter, there arose the question of the division of the spoils; and the paraffin man claimed his right to get as big a share of the profits as anyone else. Another argument in favour of his views was that, if the gas company were not in any way dependent for privileges on the town or city board, it would be found that they would extend their system considerably beyond the limit that would be observed if the lighting were in the hands of the local authority. This was his experience of both companies and corporations; and he had come to the conclusion that, as far as the interests of the consumer, at all events, was concerned, they were much safer and better off where the works were in the hands of a company than where they were under the control of a corporation. One great objection he had to gas-works managed by corporations was that these bodies changed their minds so very often with regard to the management. In fact, changes in the control of the works seemed to be their principal hobby. The man in charge was sent about his business, and another was brought in, with the result that, in the great majority of instances, the new man discovered that everything had been going wrong under his predecessor and changes were the order of the day. In his (Mr. Salmon's) opinion, what was required in a great many cases was that a travelling engineer should be appointed to look after the plant—a course which he believed would be attended with most satisfactory results. These and many other things that had come under his observation from time to time led him to the conclusion that a company gave a better and a cheaper light than a corporation, and that in every way the interests of the consumer were more satisfactorily conserved and looked after by a company than they would be by a local authority, whether town commissioners or a corporation.

The SECRETARY remarked that the Association were deeply indebted to Mr. Williamson for his paper. This was a subject which was bound to raise discussion, and upon which it could hardly be expected that they would all be of one mind. One thing, however, must be quite clear to every one, and that was that Mr. Williamson had certainly the courage of his convictions. He had given them a great many figures in support of his arguments; and he (Mr. Whimster) had just been considering them. They had all heard it said that figures could be made to prove anything; and Mr. Williamson had made very good use of the figures he had cited to establish the position he had taken up. Figures, however, could be quoted that would very considerably shake the arguments of Mr. Williamson. He (Mr. Whimster) could point to one instance of an inland town where the gas-works were in the hands of a company, and where the gas was sold considerably cheaper than in a seaport town where the works were under the control of a corporation. He could not agree with Mr. Williamson in what appeared to be his view of the question—viz., that the gas supply being in the hands of corporations was the *El Dorado*—the Land of Promise of the future. Corporations were fluctuating bodies, composed of men who were elected to a coveted position; and when these men reached the goal of their desires, and found themselves representing the public on these bodies, they felt bound to justify the confidence that had been reposed in them by the votes of their fellow-citizens. It was their object to gain popularity; and there were different ways in which this was accomplished. The two principal, and perhaps the two easiest ways of justifying this confidence, of increasing their popularity, and of raising themselves in the public esteem, were, first of all, the reduction of taxation; and, secondly, the reduction of the price of gas. Under such circumstances as these, whenever a corporation had a surplus, the members dealt with it in one of two different ways. They took this surplus away from the original purpose for which it was intended, and devoted it either to the reduction of the general taxation, or to the lowering of the price of gas to such an extent that, as a necessary consequence, the works would have to be starved in order to be in a position to pay their way at all. Under such circumstances, and with such a course of action, it was not hard to see that the result was a large expenditure, the capital account swollen to a terrible extent, and the concern burdened for the future. In the case of a company, the proprieters had a direct pecuniary interest in the undertaking, which the members of a corporation, either individually or collectively, did not possess. Any surplus which might be the result of the working of a company was conserved for their future needs; and this surplus eventually helped them to tide over times of difficulty and danger, to keep their plant well to the front in every way, and, in the matter of repairs and improvements, to make the works equal to the demands they might have to meet. Under these circumstances, a company possessed that important *desideratum*—a moderate and uninflated capital. The subject was, as he had said, one upon which there was sure to be a great deal of difference of opinion. They could not be all corporation men, neither could they be all company men; and they all had their own ways of looking at the question. But he was glad Mr. Williamson had brought the matter under their attention.

Mr. STORMONTH thought that, after the fierce onslaught which had been made upon the reader of the paper, it was time someone came to his assistance. One thing struck him in connection with the paper and the remarks it had elicited, and that was that Mr. Williamson had not made a single abstract statement; whereas, in his (Mr. Stormonth's) judgment, their worthy Secretary had made a number of them. Mr. Williamson's contention was that the interests of consumers were safer in the hands of corporations or town commissioners than they were in the hands of companies; and he had supported the position he had taken up by facts and figures which could not be controverted. It was all very well for Mr. Salmon to say he was sure that consumers were better and more fairly treated by companies than by corporations; but had he produced a single fact or figure to prove the truth of his assertion? No; he merely made the statement, and adduced nothing in the shape of statistics in order to convince them that his view was right. What the consumer wanted was cheap gas; and all the consumer was concerned about was the amount of his bill at the end of the quarter. He wished it to be clearly understood that he did not endorse all the opinions Mr. Williamson had expressed in his paper—in fact, there were several statements with which he could not possibly agree for a moment. For instance, there was the Bill which Mr. Williamson had suggested; and he (Mr. Stormonth) could only characterize the idea as a most remarkable one. He did not anticipate that any member of Parliament could be induced to take it in hand; but if one was found who was foolish enough to do so, he would be laughed at, and deservedly, by all common-sense men. With regard to Mr. Salmon's statement, that a corporation or a board of town commissioners would not carry their lighting system beyond a certain limit, he thought that gentleman was labouring under a mistake. He (Mr. Stormonth) was under the impression that they were bound to do it. For the purposes of his argument, Mr. Williamson had compared Coleraine, the town with which he (Mr. Stormonth) was connected, with Queenstown. Now, although Queenstown was a much larger place than Coleraine, the comparison was most favourable to the latter. Geographically speaking, both places were very similarly situated; and while in Queenstown gas was sold at 5s. per 1000 cubic feet, the rate in Coleraine was only 4s. 2d. For this amount, good gas of 18-candle power was supplied to the public; and the works were not in any way starved. He did not deny that, under a corporation, there was a danger of the members mis-appropriating surpluses, by devoting them to other purposes than that for which they were originally intended. But, speaking of his own Board, the Coleraine Town Commissioners, he should say that, although he did not agree altogether with the policy of the Commissioners, it was a very wise one after all. Their policy was to reduce the capital as far as possible. Last year his works turned out 13 million cubic feet of gas; and they were as good as those to be found in any place of similar size.

Mr. TULLY inquired what was the original capital expended on the Coleraine works.

Mr. STORMONTH replied that this was a question which he was not in a position to answer. He might say, however, that the works were built in 1845 by the Town Commissioners.

Mr. TULLY said that, when a Corporation obtained possession of gas-works, they rebuilt them altogether; and, of course, they were then in a position to carry them on more economically. Speaking of his own works at Sligo, he found them in a state of dilapidation. There was a leakage of 65 per cent.; and he could not purify the gas. If the exhauster was stopped, the gas went out at the hydraulic main. He had no scrubbers; and the plant generally was in a state of complete wreck. Of course, they had first of all to set to work to put the place in order; and the Directors raised £2000 on mortgage—stating that they could not give him any more. They at once went ahead, and spent £4000. They substituted a steam-engine for the old gas-engine, put in scrubbers—in fact, remodelled the place altogether; but, even with what had been accomplished, he should consider that he had done good work if he brought the place into form in five years' time. The advantage possessed by Corporations in the matter of gas supply was that they had

plenty of money with which to put their works in order and keep them so.

Mr. WADDELL said that what struck him most forcibly, when listening to Mr. Williamson's paper, was the figures he had quoted to support his arguments; and it appeared to him (Mr. Waddell) that they must refer to some years ago. He could, however, speak with certainty about his own works at Newtownards; and the figures given by Mr. Williamson with regard to them were incorrect.

Mr. WILLIAMSON explained that he took the figures from the statistics for 1890.

Mr. WADDELL said he did not supply any figures with reference to his works. However, on the broad question, there were many instances that could be used as arguments on both sides; but, as a general rule, he thought a local body representative of the people, such as a corporation or a board of town commissioners had a little more sympathy for the public than a company. Speaking of his own town, the comparison of the works before the Town Commissioners obtained possession of them, with the condition they were in now, was very much in favour of the Commissioners. Previous to the transfer of the works, the charge for gas was 6s. 8d. per 1000 cubic feet, with a rent of 4s. a year for the meters, whereas now it was 4s. 2d.; and when percentages, &c., were taken off, the charge was brought down to something like 3s. 7d. to the larger consumers. This looked very well for the Commissioners; but the same men who had formerly been connected with the management of the Gas Company were now members of the Board of Commissioners.

Mr. SALMON agreed with Mr. Waddell that the figures given by Mr. Williamson must be old, as they did not correspond with the true figures in some cases with which he was acquainted.

Mr. B. MERRILEES (Castleblaney) thought it would have been of great assistance to the members in considering this matter if they could have had before them the price of coal in the different places alluded to in the paper, and the cost of its carriage.

Mr. WILLIAMSON said he could not give information of this character.

Mr. TULLY considered it would have been an advantage if Mr. Williamson could have given a short history of the gas-works in each of the towns to which he had alluded.

Mr. WILLIAMSON said he had furnished all the information with regard to the different places that he could possibly obtain. As to the figures he had cited, the accuracy of which had been questioned, all he had to say was that he obtained them from the statistics for 1890, which were the only ones at present available.

The SECRETARY, referring to the statement of Mr. Waddell that he did not supply any figures, said that, if managers did not send in their statistics, they must take the consequences.

Mr. VALON said the question raised by Mr. Williamson's excellent paper, which had been so ably discussed by the members who had spoken—namely, as to which management was best, that of a corporation or that of a company—was a very vexed one among gas men. It at once resolved itself into two parts—first, were the consumers better off; and secondly, were the managers better off, under a corporation than under a company? The interests of the consumers and the interests of the managers did not always run together; and the question had therefore to be considered in a twofold aspect. It was possible for the manager to be well off under a corporation, and the consumers to be badly off, and *vice versâ*; and the same remarks applied to consumers and managers who were under the control of companies. In considering this question, they must start, in the first instance, with the conviction that there was something to be said on both sides. In certain cases, the consumers were better off under corporations; in others, under companies. It was the same with managers. He was a corporation man; but he was also a company man. He was Engineer for both corporations and companies; and at Ramsgate (his own place) he was under the Corporation, who had control of both the gas and the water supply. This being the case, he thought they would allow that he was in a position to look at the subject from an impartial and unprejudiced point of view. They should not, in trying to do justice to corporations, at the same time do injustice to companies; neither, on the other hand, should they, in trying to be just to companies, be unjust to corporations. He knew certain companies—perhaps it would be better not to mention names, but he could do so if the members desired it—that served the consumers quite as well as it was possible for any corporation to do. Speaking only of England, because he did not know much about the economy of things in Ireland, he thought it must be admitted that corporations, as a general rule, served their consumers better than companies. They all knew that the former made large profits; and these were dealt with sometimes judiciously, at other times injudiciously. It should be remembered, however, that where works were erected and controlled by a corporation, the rates were made responsible for the cost both of erection and maintenance; and therefore, while it was fair that the consumer should get his just share of the profit, it was not fair that he should get it all. Under such circumstances, the profit should, with all justice, be fairly divided between the consumer and the ratepayer. The ratepayer was certainly entitled to something, because, in case of a loss in the working, it would fall as a charge upon the rates. It did not, therefore, require any argument to prove that it was right and just that the ratepayer was entitled to consideration in the division of any surplus or profits resulting from the works. He had in his mind instances of corporations who dealt with their profits in this equitable style. The gas was sold at a fairly low price; and at the end of the financial year, the balance of profit was fairly divided between the consumers and ratepayers. To take a case, let them suppose that, at the end of a year's working, a corporation had from their gas-works a profit balance of £5000—any figure would do; but let them take £5000. In dealing with this sum, half of it would be given to the district rate, or other funds for the benefit and relief of the general rate upon the community, and the other half returned to the pocket of each of the consumers, in proportion to the quantity of gas consumed during the year. In his opinion, this was the fairest and most equitable way of dealing with the profits of any gas-works controlled by a corporate body. Was it a just thing to find a corporation transferring the entire profits of the gas undertaking to such purposes as the improvement of the city and the erection of large halls and other buildings? Speaking for himself, he did not think it was. He considered that this was not the proper way to dispose of the profits resulting from the corporate management of gas-works. Speaking of the interests of the consumers, he believed there could be very little doubt that, as a general rule, they received more benefit, and were generally better off, under a corporation than they were when the supply of gas was in the hands of a company. With regard to Mr. Williamson's suggestions as to the transfer of gas-works from companies to corporations, there could be no disputing the fact that it would pay corporations very well if the companies could be induced to come forward and say they would consent to the transfer of their property at the very lowest possible cost. He remembered one case in which a corporation bought the gas-works from a company, paying the latter for it from £180,000 to £200,000, which was at the rate of eight times the original invested capital; and notwithstanding this very large sum, the corporation, on gaining possession of the property, were able, in the course of time, to re-construct the entire works, reduce the price of gas, and at the end of every year to leave a large margin for the benefit and relief of the general rates. This was a case with which he was personally acquainted—one in which the corporation concerned were dealt with by the selling company as hardly as possible; and still they were able to do all he had stated. So much for the question of the interests of the consumers under corporations and companies. He now came to the consideration of the second branch of the subject—namely, the management. In discussing the question as to whether managers were better off under corporations or companies, he must again remark that there was something to be said on both sides. In his own experience, he had known careless directors of companies and careless members of corporations; and, on the other hand, he had met directors and corporations who were most zealous in the discharge of their duties, and in looking after the interests committed to their care. Speaking first of corporations, the difficulty with regard to them was that they were a shifting body. They might get a very good man whom they desired to keep, but they could not; and he would go away. Then, again, they might get a very bad one—a man who was always meddling and interfering at the wrong time and place; and they would desire to get rid of him. But here again they failed; and the objectionable man remained on. It should be remembered that they had to deal with a man as part of a body, not as an individual. There were men who sought positions on corporations, actuated by a desire to do some good for the public; and therefore they should give them credit for the best of intentions. As a general rule, men who came forward with honesty of purpose generally succeeded in the end. To sum up his experience, he thought that, where a gas undertaking was fairly purchased, properly conducted, and the manager enjoyed full and legitimate freedom, it could not be disputed that works which were controlled by the representatives of the public in the interests of the people, must be much better than those controlled by a company entirely in their own interest.

Mr. WILLIAMSON, in reply, thanked the different members who had spoken for the complimentary terms in which they had referred to his paper, and expressed the pleasure he felt at the useful discussion which he had opened. Remarks had been made with regard to the accuracy of his figures; and in this connection, he desired to say that he had no very great interest in the selection of the figures to support his arguments. It was through the kindness of Mr M'Callum that he had been able to quote the particulars from the statistics of 1890. He had been greatly struck with the comparison of the price of gas under corporations and companies; and it proved to him that benefits were to be derived from corporate management that could not be obtained from companies. Corporations had no dividend to pay; and therefore the money went to the reduction of the price of gas. With regard to the remarks of the Secretary, if any gentleman could speak with authority on behalf of companies, Mr. Whimster could. In Armagh that gentleman supplied the consumers with gas at a very cheap rate, considering the circumstances under which he had to work, and the difficulties with which he had to contend. When he (Mr. Williamson) advocated the purchase of gas undertakings by local authorities, his reason was that the capital would be reduced in this way. The money which would otherwise go to

pay the dividend would be more than sufficient to meet the instalments of the sinking fund; and in the course of time, the works would become the sole property of the ratepayers. He thought Mr. Valon had put the matter very fairly before the meeting; and he was glad that a gentleman whose opinions were entitled to such weight and attention was in favour of the corporate management of gas undertakings.

The next item on the *agenda* was a paper entitled "Sketches of Furnaces, and Utilization of the Waste Heat," by Mr. W. B. Featherstone; but it was explained by the Secretary that this gentleman was not in a position to read his paper.

Mr. T. FRIZELLE (Holywood) then read the following paper:—

THE MANUFACTURE OF SULPHATE OF AMMONIA IN SMALL GAS-WORKS.

As the present is a rather critical time for small gas-works, principally owing to the advance in the price of coal and the competition of other illuminants, I have thought that a few words in regard to working up some of our residuals might be acceptable, by bringing under your notice a source of revenue from what may at present be a nuisance, or at least a difficulty to get disposed of—I mean, of course, ammoniacal liquor. Now, I am acquainted with small gas-works where the managers find it hard to know what to do with their liquor. They are at a considerable distance from chemical works, and they have no plant for treating the liquor themselves. Besides, the railway rates are so high that some of the chemical companies will scarcely pay carriage on it, although they have it pumped into barrels free of cost. Unfortunately, our farmers and market gardeners are not aware of the very great value of it to crops, or of the amount they pay for it when purchasing it in chemical manures.

I believe the first cost of the apparatus deters a good many managers from embarking in the manufacture of sulphate of ammonia. A few words regarding the way in which I went about getting up a small plant may therefore be of service to the uninitiated. About two years ago, seeing that coals had a tendency to advance in price, I was anxious to make up in some measure, if possible, the extra expenditure thus entailed; so I decided to try the manufacture of sulphate. I wrote to different makers of plant, giving the quantity of coals carbonized per annum, and other particulars. The prices quoted were very high for small gas-works; but I have no doubt the apparatus was good. However, I visited a few works where sulphate manufacture was carried on; and I must here acknowledge my indebtedness, among other gentlemen, to our worthy President (Mr. Ross), and also to Mr. Nisbet, of Portadown, who were very kind in answering all my inquiries. On my return, I decided to collect the materials for plant, and obtained a second-hand steam-boiler to act as a still. As I required a settling-tank, I purchased a ship's water-tank which holds upwards of 1500 gallons. The saturator, 4 ft. by 4 ft. and 3 ft. deep, is made of 2½-inch plank firmly bolted, and lined with pure chemical lead, 14 lbs. to the square foot—the joints being all burned by a lead burner (it was constructed under my own supervision); also a draining-table 4 ft. by 4 ft. 6 in. and 6 in. deep, covered with 6-lb. lead; and a salt store. This is a corner of the sulphate-house floored with 1½-inch timber 12 ft. by 6 ft., and sheeted 5 ft. high round the wall with ½-inch sheeting. The floor is covered with sheet lead, 4 lbs. to the square foot, and has a fall to one corner, where a small tank is placed to receive any liquid draining from the salt. Wood sheeting is laid on the salt store floor, as sulphate does not dry well on lead; besides, the shovel would cut the lead if it were not covered.

The sulphate-house is part of the purifying-shed partitioned off; and it adjoins the retort-house, where the still is built in an old single-retort bed. The flue from the still is carried into the retort-stack; and the sulphuretted hydrogen from the saturator is also conveyed into the main flue and burned. Lime is let into the still through a little tank in the shape of a wet-meter case. A jet of steam is connected to the still, for the purpose of agitating the liquor after the lime is let into it. The steam also assists in driving off the ammonia. A catch-box is placed between the still and the saturator, to prevent any liquor from flowing into the latter. This catch-box is an ordinary gas-well or syphon-box. The settling-tank is erected in the yard, at an elevation to command the still; and a 3½-inch Archimedean pump is used to raise the liquor from the tar-well into the settling-tank. The whole apparatus cost less than £53; and up to the present time it has required no outlay for repairs.

Now with regard to the result. We have been working the plant for the two years ending in May of this year. In the first year we carbonized 734 tons of coal, and made 7 tons 8 cwt. 3 qrs. 7 lbs. of sulphate, or about 22½ lbs. of sulphate per ton of coal. This was sold at £11 10s. per ton, equal to £85 11s. 4d., less £3 for the licence and £17 14s. 11d. for vitriol and coke; leaving £64 16s. 5d., or slightly over 1s. 9d. per ton of coal. Last year we made a little more. Carbonizing 739 tons of coal, we made 8 tons 5 cwt. of sulphate, or 25 lbs. per ton of coal. This was sold at £11 per ton, equal to £90 15s., less the cost of the licence, vitriol, &c., £23; leaving a profit of £67 15s., or almost 1s. 10d. per ton of coal.

I am of opinion that distillation should be carried on with our liquid residuals so as to cover the primary products at the place where the residuals are produced; and the foregoing proves that it pays to make sulphate even in a small gas-works. I should say that works carbonizing from 300 tons of coal upwards at least should manufacture sulphate of ammonia.

Discussion.

The PRESIDENT, in inviting discussion, remarked that the subject dealt with by Mr. Frizelle was once of great importance to the members of the Association; and it had been treated in a practical and interesting manner.

Mr. STORMONTH said that, having had some experience in the manufacture of sulphate of ammonia, he desired to put before the members his views on the subject. From what had been written and said about it, one would imagine that sulphate making would be adopted in every gas-works in the country; but the fact was that, out of 100 works in Ireland, in only 18 was it carried on. He did not know what impression this fact created on the other members of the Association; but to him it seemed to indicate a most remarkable state of things. No doubt many of the works were small and medium-sized ones, far removed from chemical centres; and the carriage of the liquor would be so great that the manufacture of sulphate would hardly pay. In Coleraine they had for a time reverted to the practice of disposing of the stuff to the farmers in the surrounding districts; but these people did not display any great anxiety or hurry to get it. The result was that, when the stores were filled, the liquor ran away into the river. Recognizing that it was worth a great deal to them, they commenced the manufacture of sulphate; and he was glad to say their efforts were attended with the most satisfactory results. After paying all the necessary expenses, they had a handsome balance of profit left. This showed that they were warranted in what they did, and proved that it was much better to manufacture sulphate than to dispose of the material to the farmers. With regard to the plant that was necessary, he might say that he could not agree with Mr. Frizelle in the idea that anything second hand was good enough for the purpose. Surely such a notion was utterly and completely opposed to all modern principles and practices. Engineers would never think of, much less approve, such a course of action. He thought that it must be clear to all that the better and more complete the plant, the more satisfactory would be the results achieved.

Mr. TULLY inquired the cost of Mr. Stormonth's plant.

Mr. STORMONTH: £150.

Mr. TULLY asked Mr. Frizelle in what way he disposed of his waste gas.

Mr. FRIZELLE said he turned it into the main flue.

Mr. STORMONTH expressed the opinion that Mr. Frizelle would live to be sorry he had not put up proper plant at the beginning.

Mr. SALMON said he had been much interested by the paper, and was determined to give the manufacture of sulphate a trial in his own works. He would commence in the same way as Mr. Frizelle, and with similar apparatus; and when he had made some money, he would buy good plant.

Mr. WILLIAMSON thought it would be a good idea if the larger gas-works made an arrangement with the smaller ones around them by which the manufacture of sulphate could be carried on in the more important places. Mr. Stormonth, and others who were situated like him, could do so; and he was sure the arrangement would prove profitable to all parties.

The SECRETARY remarked that, in his opinion, papers such as that read by Mr. Frizelle were exactly what was required to make their proceedings profitable and instructive to the members. He must confess that he was much surprised at the figures Mr. Frizelle had placed before them. It was very creditable, he thought, that that gentleman should have been able to attain such satisfactory results, particularly when they kept in mind the modest character of the plant he had described. He had succeeded in doing much better than others who were a great deal more advantageously circumstanced, and who possessed the most complete plant to be had. He (Mr. Whimster) impressed upon gas managers the value and utility of manufacturing sulphate. He advocated it very strongly; and he thought they should even go farther than that. He not only boiled his ammoniacal liquor, but also his tar, and extracted the naphtha from it. After the boiling and the extracting process, the tar was in a much better condition for sale or for being burned in the furnace than it was in its crude state. By these means they gained the naphtha, for which a good price could be obtained; and the result was to make the tar thus treated a far more valuable commodity.

Mr. STEARS asked Mr. Frizelle if he used lime in the manufacture of sulphate.

Mr. FRIZELLE replied that he did.

Mr. STEARS said the results obtained were most satisfactory, in fact, quite as good as if Mr. Frizelle had had at his command the most elaborate and expensive apparatus.

Mr. FRIZELLE said, before the discussion terminated, there was just one point upon which he desired to make a remark, and that was with reference to the escape of the sulphuretted hydrogen through the main flue. The Inspector called upon him on two occasions, and expressed himself perfectly satisfied with the arrangement.

Mr. SALMON supposed that there was a very high shaft.

Mr. FRIZELLE: Not exceptionally high—about 36 feet.

Votes of Thanks.

The usual votes of thanks were then accorded to the President and the other officials for their services during the year, as well as to Messrs. Williamson and Frizelle for their papers. The acknowledgments of the members to the Town Clerk of Belfast, for his kindness in granting them the free use of the Town Hall for their meeting, were also expressed in a similar manner.

This concluded the business.

The members then proceeded to the gas-works, which, as our readers are aware, are in the hands of the Corporation. They were most courteously received, in the absence of the Engineer and Manager (Mr. J. Stelfox), by Mr. Sharp, his assistant, and were shown over the establishment; the Claus purification plant, which has been erected (but was temporarily out of action), being explained to them. At the close of the visit, the members wended their way to the Castle Restaurant, Queen's Arcade, where they dined together. Mr. R. Ross occupied the chair; Mr. W. S. Stormonth being in the vice-chair.

THE USEFUL DUTY OF GAS-BURNERS.

M. Witz has communicated to the *Comptes Rendus* some observations upon the photogenic duty of luminous sources. He says we can calculate the mechanical duty of a thermic engine; but what, he asks, is the photogenic duty of a light-source fed by units of heat (calories)? The two principles of thermodynamics enable us to determine the duty of a gas-engine giving a horse-power hour from *n* quantity of gas. What is the duty of a gas light burning *n* quantity of gas in candle or Carcel hours? No physicist can answer this question, which is perhaps the reason why it is never asked.

It is not to be supposed that the photogenic duty of a light-source cannot be defined; the difficulty lies in stating the ratio of the luminous energy of the source to its disposable energy. We know the quantity of heat-energy that goes to maintain the source; but we cannot calculate the active force of the luminous movement, because we do not know the mass of the ether which is affected (*ébranlée*). We therefore have no absolute unit of quantity for light; we can only appreciate these quantities by the degrees of more or less excitation of the optic nerve, which permits of a comparison, but not of an absolute measurement. It is true that we can indirectly determine the duty of a luminous source. Let us suppose the existence of a source of which all the energy is transformed into luminous heat, and the spectrum of which is wholly composed of luminous calorific radiations, to the exclusion of obscure calorific radiations and also of dark chemical rays. The duty of such a source will be equal to unity. The ratio of the units of light produced to the units of heat expended will be the maximum; and this will serve as the basis of comparison for all luminous sources of which the luminous value per heat-unit is known. Unfortunately, this typical source, of which we conceive the possible existence, is yet to be discovered. We do not forget that MM. Langley and Very have observed in the Havana a *Pyrophorus noctilucus* emitting only luminous rays; but what energy is expended by this creature to develop the equivalent of a Carcel-hour?

For the time being, it is necessary to be content with measurements of the comparative duties of various sources of light. The following are the values which M. Witz has found for some of these:—

Sources.	Consumption.	Heat-Units (Calories) transformed.	Intensity in Carcels.	Calories per Carcel-Hour
Star candle . . .	10·5 grammes per hour	110	$\frac{1}{9}$	716
Bengel gas-burner .	105 litres gas per hour	567	1	567
Recuperative gas-burner	35 " " "	189	1	189
Incandescent electric lamp	3·5 watts per candle	3·1	$\frac{1}{6\cdot3}$	20
Electric arc . . .	4·5 " "	4	1	4

If, therefore, the absolute duty of the voltaic arc is equal to 0·5, and this value is a maximum, that of a stearine candle will be 0·01; and we shall have 0·02 for the best recuperative high-power lamps. As already known, the disposable energy of light-sources is thus very badly utilized by them.

M. Witz then relates an experiment of his own. Having been induced to inspect, at Lille, an electric lighting installation by arc and incandescent lamps, supplied by a gas-engine driving a dynamo, M. Witz was able to compare the quantity of gas consumed under these conditions with that previously required for directly lighting the same place by means of recuperative and other gas burners. There were 16 arc and 71 incandescent 16-candle lamps replacing 6 high-power Sée gas-lamps of the double recuperative type, 91 burners (kind not stated), and 19 batswings. The electric lights disseminated 15½ per cent. more light than the gas-burners, as M. Witz found by examination of the lighting of the areas; and, in addition, they lighted some parts where there had not been any gas-lamps. Now, in these conditions the consumption of the gas-engine was only 21,500 litres per hour; while the lighting burners took 26,000 litres hourly. Thus, by using gas to create motive power for driving a dynamo, there was an economy of 17 per cent. upon the gas consumption for lighting directly, besides an increased lighting effect. In other words, in spite of the employment of the two intermediary transformations—engine and dynamo—the duty of this complex plant was higher than that of the gas-burners alone. The result is paradoxical, but rigorously true. The superiority of the duty of the system of engine-dynamo-lamp supplies a basis of valuation for the photogenic duty of the gas burnt in lighting apparatus. A good motor yields 20 per cent.; the conversion and the dynamo, 75 per cent.; the distribution and the lamps, 70 per cent.

$$0{\cdot}20 \times 0{\cdot}75 \times 0{\cdot}70 = 0{\cdot}105.$$

If we admit that the photogenic duty is 50 per cent. in electrical apparatus, the absolute duty of the system in question is, at the most, only 0·05; and we can only conclude, from this comparison that the duty of gas-burners is greatly inferior even to this.

THE LOCOMOTIVE STEAM-CRANES AT KENSAL GREEN.

In a recent number of *Engineering*, there was an illustration of a locomotive steam-crane, designed and constructed by Mr. T. Smith, of Rodley, near Leeds. As two of these cranes are in use in connection with the coal-conveying plant at the Kensal Green Gas-Works, as mentioned by Mr. M'Minn in the paper read at the recent meeting of the Incorporated Institution of Gas Engineers, the following particulars may be interesting to our readers, especially those who visited the works on the occasion referred to.

The crane weighs 21 tons, and is capable of lifting 2½ tons at a radius of 20 feet from the central pillar by a single chain. It is carried on a cast-iron frame, with wrought-iron chequered cover-plates on the top. This frame is mounted on two steel axles running in hard gun-metal axle bearings; there being four steel-tyred travelling-wheels set to the standard gauge of 4ft. 8½ in. A set of rail clips are provided with corner screws to permit of raising the carriage and crane from the rails when the crane is put in operation. The whole superstructure rotates on a central pillar fitting into the frame. The jib is of wrought-iron plates and angles braced and riveted on the lattice principle. Hoisting is through single-purchase spur gearing, controlled by clutch and lever. The drum is 18 inches in diameter, and the hoisting speed is 95 feet per minute with the maximum load of 2½ tons. There is a friction brake keyed to the barrel shaft, and controlled by a foot lever. The revolving motion is by spur and mitre wheels, geared up from the engine-shaft to a main internal wheel on the frame, and worked by a double friction cone. The internal wheel roller-path and the anti-friction rollers are of steel. The crane may be rotated in either direction without stopping or reversing the engines; and the operation is controlled by screw lever and light hand-wheel. The speed is at the rate of three revolutions per minute. The crane can be propelled along the rails by its own engine; motion being transmitted from the main shaft to the axles through spur and bevel wheels, controlled by clutch and lever. In all cases the principal bearings are adjustable, and are bushed with hard gun-metal; while the mitre gearing is of steel. The crab sides carry the shaft and gearing in bosses; and the sides are firmly secured to the swivels. The top swivel has a centre bored to suit the top of the pillar, while the bottom swivel receives the jib in front and the tank behind, and is provided with back, front, and side anti-friction rollers running on a turned path or frame, so as to reduce the strain on the central pillar, and allow the whole to rotate more easily.

All the movements of the crane—hoisting, revolving, and locomotion—are effected through gearing on the main shaft, which is actuated by an engine with two cylinders 8½ inches in diameter and of 12-inch stroke. The cylinders are fitted one on each side of the main framework of the crane. The engine has steel piston-rods, and wrought-iron connecting-rods, turned from end to end, with hard gun-metal bearings. The reversing is by link motion, case hardened. The cross-head works in circular guides. The main shaft and all the feathers in it are of steel, with balanced disc-plates and turned crank-pins. The boiler supplying steam is vertical, and of mild steel. It is 10 feet high and 4 feet 3 inches in diameter, with four cross-tubes intersecting the fire-box. The working pressure is 80 lbs. to the square inch. As in the case of the cylinders, it is lagged with silicate cotton and sheet metal. The feed-pump is placed between the tank and the boiler, and is worked from the engine-shaft by eccentrics. In the frame of the crane is fitted a water-tank, the top of which serves as a platform from which the crane is worked. The feed water is heated in a tank before passing into the boiler.

The Gaslight and Coke Company's Assessment Appeals.—Owing to the pressure on our space to-day, we are compelled to hold over the continuation of the report of the proceedings in The Gaslight and Coke Company's assessment appeals, the further hearing of which, as already announced, has been adjourned till October.

REGISTER OF PATENTS.

Manufacture of Illuminating Gases.—Love, J., of Stratford, Essex. No. 10,329; July 3, 1890. [11d.]

This invention relates to plant for the manufacture of gas for illuminating and other purposes, an important feature of which consists in the provision of apparatus whereby water gas, hydrocarbon, or other gas for carburetting or enriching the water gas, and the steam for the formation of the latter, are produced and mixed in one retort.

Fig. 1.

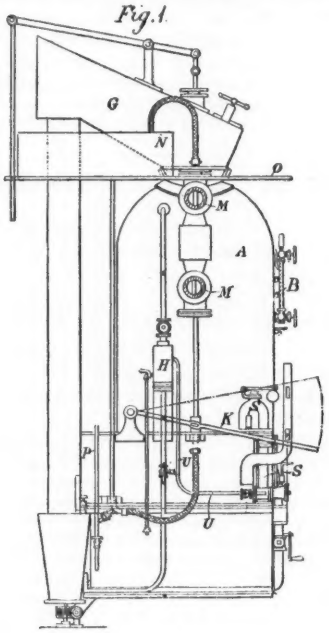

Fig. 2.

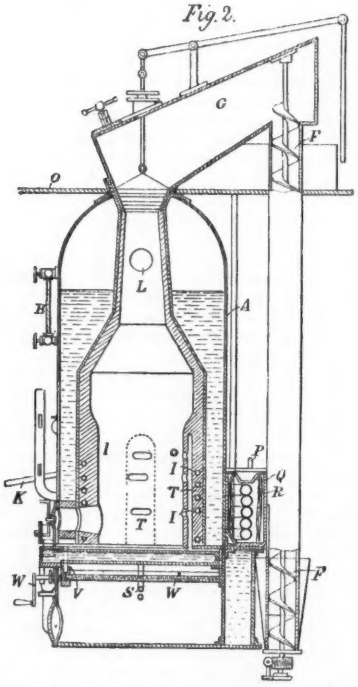

Fig. 1 is a side elevation of the apparatus; and fig. 2 a section of same, looking the opposite way.

A is a cylindrical retort, having a central furnace or combustion chamber fitted with fire-bars, and forming, with the outer shell of the retort, an annular water and steam space—the whole being somewhat similar to an ordinary upright or vertical boiler. There is a carburetting chamber, which partially surrounds the retort above the hot-well (to be presently described). The water and steam spaces are provided with a water-gauge B, try-cocks, a pressure-gauge, and a safety-valve—all of the usual construction. The steam-engine, secured to the outer shell of the retort, is supplied with the necessary steam from the steam-space of the retort; while a feed-pump, firmly attached to the lower portion of the retort, is worked by the engine. The pump is intended for supplying the feed-water from the hot-well to the water-space in the retort. Besides these, is a centrifugal or rotary blower or fan (for creating the necessary air-blast when the charge of coke or other fuel is being rendered incandescent), also secured to the lower portion of the retort or to a bracket thereon, and driven by belt gearing from the engine. F is an endless screw or elevator for raising the fuel to the charging-hopper G. This endless screw, worm, or elevator is enclosed in a cylindrical or other casing; and a hopper, adapted to contain a sufficient quantity of fuel to form a charge, and communicating therewith, is provided at the lower extremity of the casing. The upper extremity of the casing opens into the charging-hopper, or into an inclined air-tight shoot or channel communicating therewith. There is an air-tight door or cover which can be closed when the charge in the hopper or receptacle is being raised and delivered into the hopper.

H is a box or casing having three ports or ways, provided with stop cocks or valves, and connecting respectively with the upper or steam-space of the retort A, and with the fan or blower. I is a coil arranged in the interior of, and surrounding the lower part of the combustion chamber, but separated therefrom and protected by a lining of fire-brick, fire-clay, or other refractory material provided in the combustion chamber. The coil terminates at one extremity in a perforated pipe or nozzle arranged in the ash-pan or ash-pit beneath the fire-bars; while the other extremity is connected with the port or way in the box or casing H. Mounted in the box or casing is a slide-valve somewhat similar to an ordinary D slide-valve, and fitted with a rod or stem J¹ passing fluid-tight through a hole provided in the valve-box or casing. The rod is connected to a lever K, one extremity of which is pivoted to a bracket firmly secured to, or formed on, the outer wall of the carburetting chamber. By operating the lever so as to move the slide-valve upwards or downwards, communication is established between any of the ports or ways mentioned above, or between the steam-pipe, coil and air-pipe. Consequently either air or steam can be admitted to the coil. The free end of the lever K, works in a slot in a guide bracket, and can be secured in its upper or lower position by a wedge-pin passed through holes in the bracket. The steam for forming the water gas is superheated to the requisite degree whilst passing through the coil I in the heated lining of fire-brick, fire-clay, or other refractory material.

The feed hopper G is supported on the crown or upper part of the retort, and it extends through the outer shell and the steam-space thereof; its lower extremity communicating with the crown or upper part of the combustion chamber. A weighted valve provided with asbestos or other packing rings closes the aperture into the combustion chamber during the manufacture of the gas. A lever pivoted to a bracket is secured to the outer surface of the hopper G. The short arm of the lever is connected, by a link and a rod passing through a stuffing-box and gland, with the valve shown; and the long arm is provided with a hanging rod or chain, by means of which the valve can be operated from the outside of the hopper. The feed-hopper is provided, moreover, with a door having an air-tight joint formed round it, and which can be removed to permit access to the interior of the hopper for examination, or for the insertion of a charge of fuel if required.

L is a pipe extending through the steam-space, and communicating at one end with the upper part or crown of the combustion chamber, and at the other end with a valve box or chamber fitted with a double conical valve, having asbestos or other packing rings. M are pipes or mains, each of which is connected at one end with the valve box or chamber; the other end being intended to be connected with suitable receivers or holders. One of these pipes is intended for carrying away the producer gas given off while the fuel in the combustion chamber is being blown into a state of incandescence; and the off-pipe is for carrying away the carburetted water gas. The double conical valve L is so arranged that, when moved in one direction, it closes the aperture to the water-gas pipe, and, when moved in the other direction, it closes the aperture to the producer-gas pipe. In order to prevent overheating of the various valves by the hot gases, they and their stems or rods are made hollow, to allow for circulating water or other cooling medium through them from a tank N or other suitable source of water supply. O is a staging or platform for supporting the tank and other portions of the apparatus, and for permitting access to the hopper G and other parts.

The carburetting chamber is provided with a pipe P governed by a stop cock or valve, and through which the chamber may be filled or charged with a hydrocarbon or other carburetting liquid as described in patent No. 14,031 of 1889. The receptacle is fitted, moreover, with trays Q and with wicks or cottons as described in the former specification. R is a coil arranged in the carburetting chamber and supplied with hot water or steam for evaporation purposes. S is a pipe for carrying off, and delivering into the combustion chamber of the retort, the hydrocarbon vapour from the carburetting chamber. It is governed by a stop cock or valve placed within easy reach of the operator, and is connected at one end with the carburetting chamber. This hydrocarbon-vapour delivery-pipe has two branches, one of which is attached to a perforated pipe or nozzle extending into the ash-pan and underneath the fire-bars, and the other with a ring or pipes having nozzles projecting into the lower and open extremities of the flattened pipes T extending into, and embedded in, the refractory lining in the combustion chamber, and communicating with it through elongated holes. U is a pipe governed by means of a stop cock or valve and connected at one end with the pipes R, and at the other end with the valve box or casing H, or directly with the steam-space of the retort. Live steam can be admitted to the pipes through the pipe U, when the heat of the water circulating through the hollow fire-bars is insufficient for the purposes of evaporation.

For clearing the fire-bars so as to permit the free passage of the air, steam, and hydrocarbon vapour, knife-blades or prickers V are arranged to project between the bars and are supported upon a cross-piece or bar sliding lengthways of the bars on suitable guides. W is a screw-threaded spindle, restrained from endwise motion and working in a correspondingly screw-threaded hole, or in a nut in the cross-piece or bar V, and provided with a crank-handle, which can be operated from the exterior of the ash-pit, and by means of which the cross-piece or bar and knife-blades or prickers can be traversed to and fro from one end of the bars to the other, so as to clear the spaces between them.

The operation of the apparatus is as follows: A charge of fuel is inserted into the combustion chamber and ignited. On the proper stop cocks or valves being closed or opened, the charge is blown by

the fan E into a proper state of incandescence; the air delivered to it being raised to the right temperature during its passage through the coil I. The producer gas given off having been removed, the blast is shut off, and steam is admitted to displace all air in the producer. After this the lever K is operated to move or adjust the valve so as to admit steam to the combustion chamber through the coil I, and thus superheat the steam and produce water gas. The water gas and hydrocarbon or enriching gas are fixed and rendered permanent by contact with the incandescent fuel in, and the heated walls of, the combustion chamber; but sometimes cross-tubes are arranged in the upper part of the combustion chamber, between which the gases pass on their way to the water-gas outlet. When the incandescent fuel in the combustion chamber is exhausted, the lever K is moved back to its former position; a fresh charge of fuel is admitted through the hopper G; and producer gas is again made. This alternate action continues so long as the apparatus is in operation.

Gas and Gasoline Engines.—Vanduzen, B. C., of Winton Place, Ohio, U.S.A. No. 5158; March 23, 1891. [11d.]

This lengthy specification of a considerable number of minor modifications of construction of gas and gasoline engines is not of a character to abstract apart from the drawings, consisting of three sheets of details.

Gas Motor Engines.—Bickerton, H. N., of Ashton-under-Lyne. No. 6090; April 9, 1891. [8d.]

These improvements have for their principal object the provision of means for introducing and igniting the first charge in gas motor engines, for the purpose of starting them.

To accomplish this, there is attached, in connection with the space behind the piston of the engine, a pipe provided with a stop-valve, and in connection with the main; so that, when the valve is opened, the gas may enter the cylinder by its own pressure and mix with some of the air contained therein. The superfluous air displaced by the gas thus entering escapes either through the exhaust-valve (this being temporarily propped open for the purpose), or through another stop-valve. The same stop-valve which controls the entrance of the gas may, however, by being constructed with two passages, be used for both purposes; or (and by preference) the gas-pipe is connected with the supply-pipe from the gas-bag to the engine. In this case, by closing the communication between the bag and the main, after the bag has been filled, it is possible, by the more or less compression of the bag (by hand, or by a lever provided for the purpose), to approximately measure the quantity of gas introduced into the cylinder.

One means employed for igniting the charge is to make in any convenient part of the cylinder a small hole, provided with a flap-cover on the inside; and to project against it on the outside a flame of sufficient velocity to displace the flap-cover—and enter the cylinder thus igniting the charge contained therein. The flap-cover is therefore closed by the increased pressure resulting from the explosion, and so prevents any escape of the products of combustion through the hole.

Another means is more particularly applicable to the class of gas-engine in which ignition is effected by a heated tube. In this arrangement, a special plunger and cylinder are used in connection with the hot tube, in such a manner that, by drawing the plunger by hand, a partial vacuum or space is produced in the tube, which allows replacement by the combustible charge thus drawn from the cylinder into the space. This charge, upon coming into contact with the hot tube, is ignited and fires the whole. Or, by the aid of the plunger, there may be forced up into the tube, in which there are inlet and outlet openings, some small portion of the charge, the flame from which is allowed to escape into the cylinder, and thus fire the whole.

In order that the engine may stop with the crank in the best position for starting again, and thus obviate the necessity of setting in motion by hand, there is constructed on the side shaft of the engine a special set of cams; so that by moving the bowls on the exhaust and air valve levers, these latter are so manipulated as to bring gaseous pressure on the piston at the right time to cause the engine to stop in the correct position.

APPLICATIONS FOR LETTERS PATENT.

12,718.—Allison, H. J., "Atmospheric gas-burner." A communication from M. Lungren. July 27.

12,818.—Hickenlooper, A., "Improvements in gas-retort charges." July 28.

12,852.—Pover, F. T., "Improvements in or relating to ovens and kilns for the firing of bricks, tiles, potters' goods, and the like, by gas." July 29.

12,922.—Williams, H., "Improvements in gas motor and similar engines." July 29.

12,981.—Menard, L. R., "Improved method of and means for firing the charges of gas-engines." July 31.

13,096.—M'Mullen, J. A., "Improvements relating to conduits applicable for combined use as casings for electrical conductors and for gas supply, or for either use separately." Aug. 1.

13,104.—Defries, W., and Fenny, V. J., "Improvements in gas-lamps." Aug. 1.

13,118.—Reisert, M. E., "Improvements in and relating to automatic liquid-meters." Aug. 1.

13,130.—Mills, B. J. B., "Regulating-valve for gas-furnaces." A communication from C. H. Holton. Aug. 4.

13,217.—Richmond, E. W. T., and Messrs. Richmond and Co., Limited, "Improvements in gas-stoves." Aug. 5.

13,302.—Allison, H. J., "Improvements in gas-engines." A communication from G. E. Hoyt. Aug. 6.

13,338.—Douglas, S., and Nicholls, H. W., "Improvements in fluid meters." Aug. 7.

13,345.—Brierley, W., "Improvements in appliances for automatically producing a light or flame for illuminating or lighting purposes." A communication from O. Lindner. Aug. 7.

13,368.—Haynes, J., "Improvements in or appertaining to coin-deed or coin-actuated mechanism, specially applicable to gas-meters and the like." Aug. 7.

LEGAL INTELLIGENCE.

YORKSHIRE SUMMER ASSIZES—LEEDS TOWN HALL.

Saturday, Aug. 8.

(*Before Mr. Justice* Day.)

Tennick v. The Leeds Forge Company—The Water-Gas Poisoning Case.

In this action the plaintiff was Mr. George Tennick, who sued as the executor of the late Henry Tennick, and claimed, on behalf of four children of the deceased, damages for the loss of their father, who met with his death in November, 1889, under circumstances reported in the Journal at the time, and due, it was alleged, to the negligence of the defendant Company.

Mr. Waddy, Q.C., and Mr. C. M. Atkinson appeared for the plaintiff; Mr. E. Tindal Atkinson, Q.C., and Mr. Robson for the defendants.

Mr. Waddy, in opening the case, said that the deceased was a skilled workman, in the employ of the Leeds Forge Company. He had higher wages than most of the other men; but though he was in charge as foreman, he did an ordinary workman's labour, was liable to be dismissed by the Company, and, indeed, a few months before his death, was actually dismissed on one occasion, but was reinstated. It was set up for the defence that Tennick was a contractor; but this was not the case. Tennick's death was caused by the use of water gas—a gas frightfully dangerous if not properly used; in fact, the proportion of deaths from ordinary gas and water gas was as 1 to 330. Mr. Samson Fox was the Chairman of the British Water Gas Syndicate; and this gas was introduced into the works of the Leeds Forge. It gave out great heat, and was used for welding purposes as well as for illumination. Dr. Stevenson, of the Board of Trade, who gave evidence at the Coroner's inquiry in November, 1889, whose testimony the parties had agreed to accept without requiring his attendance in Court, said that water gas contained 40 per cent. of carbonic oxide. It was the most poisonous constituent of coal gas, of which it formed from 4 or 5 to 8 per cent., and of the fumes of charcoal, of which it formed 5 to 10 per cent. Carbonic oxide was a deadly gas. Its effects were insidious, because it was colourless, destitute of odour, and did not irritate the air-passages, but rather acted as a narcotic; so that it might be breathed without any alarm being excited in the victim. It killed by a special kind of suffocation, even when present in the air in very small quantity.

Mr. Tindal Atkinson said there was no question that Tennick and the other man (French) died from the inhalation of the gas. The first question was whether the case came within the Employers' Liability Act, and the other question was one of damages.

His Lordship observed that, to bring the case under that head, the plaintiff must show some neglect of duty on the part of the employers.

Mr. Tindal Atkinson admitted there was negligence on the part of the person whose duty it was to make the gas odorous, and that to this extent the defendants would be liable, supposing they brought themselves within the Employers' Liability Act.

Mr. Waddy, continuing, said the plaintiff did not know how the water gas escaped; but it would be admitted that the two men, Tennick and his brother-in-law, French, were killed by the carbonic oxide of the water gas, which at the time was absolutely without odour. The bodies were removed into the band-room, and five or six medical gentlemen in Leeds going there, were also overcome by the gas which had escaped into the room; and one of them (Mr. Scattergood) nearly lost his life. Had the gas been odorized, the bodies would have borne the odour; and it was by the neglect of this simple provision that the lives of the two unfortunate men were lost. Tennick was 36 years of age, in the prime of life, and left four children under the age of 14; and he (Mr. Waddy) thought, after the evidence to be stated, he should be entitled to ask the jury how much they would award to these children for the loss of their father.

George Tennick, the plaintiff, having been examined, in answer to Mr. Tindal Atkinson, said the deceased had from 40 to 70 men employed under him; and he paid their wages. He had known him to dismiss men. There were three men in the Forge who had gangs of men under them; and each of these three men had a shed of his own. Each one had plans sent down from the Forge, showing how the work was to be done. Witness's brother left over £600. Some of the jobs done were for considerable sums of money. The deceased agreed for a lump sum for doing so much work. He employed his own labour; and whatever difference there was would go into his pocket.

Re-examined: The Company sent to the deceased a list of the men whom he had to pay; and the Company kept the time of these men and also of the deceased. The deceased was paid by piece-work.

George Taylor, formerly foreman in the flanging department of the Company, said that Tennick had drawings sent to him, and he had to work by them. He had men under him; and witness did not know what arrangements existed between the men and Tennick. He believed that sometimes Tennick would make as much as £10 per week.

Mr. Tindal Atkinson, at this point, said he admitted that the gas was not odorized, and therefore negligence must have arisen; and also that the point in the pleadings as to contributory negligence must go too. The question was mainly one of damages.

In cross-examination, witness said that if any of Tennick's men had misconducted themselves, he could have told Tennick to turn them out of the yard. It was the plan to let out work to sub-contractors, and Tennick was one of these. He was not bound to work with his own hands unless he liked. If Tennick had been ordered to go on day-work, he would have had to do it.

Monday, Aug. 10.

On the resumption of the proceedings this morning, after a witness named Melvin had been partially examined, a long consultation took place between the learned Counsel on both sides. At its conclusion,

Mr. Waddy, addressing his Lordship, said that there was one difficulty between Mr. Atkinson and himself; and although not a question of law or practice, it was a matter upon which they would like to consult his Lordship as to what it would be right to do for both sides.

The learned Judge and leading Counsel then retired. On their return into court,

Mr. WADDY said he thought they had arrived at a solution of the difficulty. His Lordship had been good enough to make a suggestion, which Mr. Atkinson desired to vary; and he thought that the desire was well founded. Accordingly, they had agreed that the name of Mr. Williams, Solicitor to the West Riding, should be inserted in the verdict.

His LORDSHIP: Then the arrangement is that Mr. Williams, West Riding Solicitor, should peruse the charges of the plaintiff's solicitor (Mr. Child), and allow him, apart from the ordinary rule of taxation, such a sum as would cover the amounts reasonably incurred for the purpose of securing a verdict of £800—the intention of both parties being to give the children of the deceased £800 among them.

Judgment was then given for £800 and costs.

Wolverhampton Corporation Water Department.—The annual balance-sheet of the Wolverhampton Corporation Water Committee shows that a profit has been made of £1365, after paying interest, charges on the capital, and providing for the sinking fund. The receipts for water are £945 in excess of those of last year.

Bradford Corporation Gas Supply.—In moving the adoption of the minutes of the Gas and Electricity Supply Committee at the meeting of the Bradford County Borough Council last Tuesday, Alderman Priestman said he had before him the accounts of the Department for the past half year. The profit was £6249, against £6010 for the same period of the previous year. The coal that had been carbonized had cost £6150 more; the advance in the average price being nearly 1s. 5d. per ton. There had been an increase in stokers' wages, in consequence of the eight-hour movement, of £800. The accounts also showed a decrease of £770 in the repairs of the works, and a decrease in the lighting of the public lamps, which amounted to £3224 this year. There was an increase in the sales of gas of £5270, in coke of £1650, in tar of £700, and in oxide of £500; and there was a decrease in the receipts from bank interest of £470. The only items which had been charged to the capital account during the half year had been £707 in repairs of mains, and £3560 expended on the Birkshall Gas-Works. A total capital of £582,871 had now been spent on the works. The minutes were adopted.

Johannesburg Gas Company, Limited.—A special meeting of this Company was held last Wednesday, under the presidency of Mr. W. F. Lance, to pass the resolution submitted to the proprietors at the meeting on the 15th ult. (see *ante*, p. 129), to approve the formation of a new Company. The Chairman reminded the proprietors that on the previous occasion the number of proxies was insufficient to carry the motion then proposed. The Directors had on the present occasion, however, more than the requisite number—viz., 90,000 shares out of a total of 130,000. Although the capital mentioned was not exceeding £250,000, they hoped to keep it down to not more than £200,000. The Board had not completed the arrangement for carrying out the proposition set forth in the resolution submitted; and it was therefore proposed to adjourn the meeting to Oct. 15, and then it was just possible they might have to submit some scheme slightly differing from that sketched out. He concluded by moving a formal resolution—"That a new Company, to be called the Johannesburg Lighting Company, be formed for the purpose of working concessions for lighting Johannesburg with gas and electricity respectively." Mr. Barker seconded the motion, and it was carried. The meeting was then adjourned to the above-named date.

Gas Exhibitions at Burnham and Highbridge.—A series of cookery lectures was commenced on Monday last week by Miss Thwaites, in the Town Hall, Burnham (Somerset), and was continued during the latter part of the week in the Town Hall, Highbridge. At each place an excellent display of gas appliances was provided by Messrs. Unsworth and Richmond, Limited, of Warrington. Their novelties included the "Model" gas cooking-range, heating-stoves, boilers, grillers, &c. Some fine lacquered gas-fittings were shown by Messrs. Russell and Co.; while the "Factory" regenerative lamp and the "Meteor" high-power lamp were displayed respectively by the Thomas Lighting Company and Messrs. H. Greene and Sons. On Monday, Mr. Board, Chairman of the Burnham Gas Company, opened the proceedings with a very instructive speech, showing that the Company were anxious to do all that was possible for the benefit of the town. Other addresses were delivered on the following day. On Thursday, at Highbridge, Mr. J. Burnett, Chairman of the Gas Company, opened the exhibition; and on Saturday Mr. E. W. T. Richmond attended, and gave an address on the advantages of cooking by gas. Praise is due to Mr. Fentiman, who managed the exhibitions; and also to Miss Thwaites, the lecturer.

The Water Question at Amsterdam.—According to the Amsterdam correspondent of *Industries*, the Special Committee appointed by the Town Council to inquire into the working of the agreement between the Municipality and the Hill Water Company as to the water supply have issued their report. The following are some of the conclusions the Committee have arrived at: (1) The water-works of the Company are jointly and severally totally inadequate to furnish a supply in accordance with the 11th article of the concession; (2) the water supply area in the rivers from which the Company draw their water is wholly inadequate to furnish a supply in accordance with the concession; (3) in order to provide for an adequate water service for Amsterdam and Haarlem, both towns practically taking their supply from one area, it is necessary to construct new pipes, so as to have an additional water area of 1850 acres in 1894, 2200 acres in 1895, and 4400 acres in 1900. At the same time, the present area from which the water is taken ought to be extended to 9260 acres; while the existing means of storing, transporting, and purifying the water ought to be improved. The total cost of these improvements is estimated at £541,600. The Committee finally state that the proposed increase of water area and supply will only suffice for the wants of the urban population in Amsterdam and Haarlem till the year 1900; but that there is sure to be another deficit in 1900, allowing for the usual increase in the number of inhabitants and in that of water consumers.

MISCELLANEOUS NEWS.

METROPOLIS GAS SUPPLY.

Recent Appeals to the Chief Gas Examiner.

Continued from Vol. LVII., *p.* 903.

In the matter of the appeal of the SOUTH METROPOLITAN GAS COMPANY *against the reports of the Gas Examiner at the Stoney Lane testing-place, showing deficient illuminating power in the gas supplied by the Company on Dec.* 9 *and* 10, 1890.

At the hearing appointed for the parties in these appeals, Mr. Dibdin appeared for the County Council. Mr. F. Livesey sent in a written statement, to the effect that he had not obtained such evidence as he had expected to obtain against the statutory accuracy of the apparatus employed in the tests. He furnished no evidence against the statutory character of the tests.

The report of the Gas Examiner at the Stoney Lane testing-place, of deficient illuminating power in the gas supplied by the Company on the 9th and 10th of December last, must be accepted.

(Signed) ALEX. W. WILLIAMSON, Chief Gas Examiner.

May 14, 1891.

In the matter of the appeal of the COMMERCIAL GAS COMPANY *against the report of the Gas Examiner at the Parnell Road testing-station, showing deficient illuminating power in the gas supplied by the Company on Dec.* 22, 1890.

The appeal was lodged within seven days after the day on which the report was made. At the hearing which I gave to the parties in this appeal, Mr. H. E. Jones appeared for the Company; Mr. Dibdin appeared for the County Council.

It appears that this station has been very little liable to disturbance from depositions of naphthalene.

On receiving notice of the low test on the 22nd, the Company examined the service-pipe and obtained evidence that a considerable deposition of naphthalene had taken place in it. The removal of the deposit was followed by a recovery of the illuminating power of the gas.

I consider that the defective illuminating power was occasioned by an unavoidable cause.

(Signed) ALEX. W. WILLIAMSON, Chief Gas Examiner.

May 16, 1891.

In the matter of the appeal of the COMMERCIAL GAS COMPANY *against the reports of the Gas Examiner at the Parnell Road testing-place, of deficient illuminating power in the gas delivered by the Company on Jan.* 3 *and* 6, 1891.

Each of the appeals was lodged within seven days after the days on which the respective reports were made. At the hearing which I gave to the parties in these appeals, Mr. H. E. Jones appeared for the Company; Mr. Dibdin for the County Council.

It was stated, on behalf of the Company, that the defective illuminating power of the gas was occasioned by the deposition of naphthalene in the service-pipe, owing to the exceedingly low temperature which prevailed at that time. In support of this contention, it was stated that the service-pipe was attended to every day; and the disturbances ceased. It seems reasonable to believe that the loss of illuminating power may have been occasioned by the circumstance mentioned by the Company; but as a similar disturbance took place at the same station not long before, and was found to be remediable by clearing out the service-pipe, it is a pity that the Company did not, before these low tests, commence the daily clearing of the service-pipe, which they adopted afterwards with success.

I consider that the reports of the Gas Examiner must be accepted.

(Signed) ALEX. W. WILLIAMSON, Chief Gas Examiner.

May 19, 1891.

SOUTH METROPOLITAN GAS COMPANY.

The Half-Yearly Accounts.

In the JOURNAL last week we published the report of the Directors of this Company for the half year ending June 30 last, which will be presented at the meeting of shareholders to be held to-morrow. We now give the accounts for this period; epitomizing, as on previous occasions, those portions in which there is little or no change, and giving the remainder in full.

Statements Nos. 1 and 2 show the amount of share and loan capital raised at the end of June last. The former stood at £2,050,000, the latter at £700,000; being increases of £33,500 and £22,000 respectively as compared with the figures at the close of the past year.

Statements Nos. 3, 4, and 5—the capital, revenue, and profit and loss accounts—are given in full on p. 314.

Statements Nos. 6, 7, and 8 show the positions of the reserve, renewal, and insurance funds. The reserve fund has been reduced from £150,059, at which it stood on Dec. 31 last, to £114,449, by the transfer of £35,610 to the profit and loss account. The renewal fund stands at £8992; and the insurance fund at £12,747.

Statements Nos. 9 to 11—furnishing particulars as to the manufacturing operations of the Company—are given in full; as is also No. 12, the general balance-sheet.

Annual Meeting of Directors and Workmen.

Last Saturday afternoon, the Second Annual Meeting of the Directors officers, and workmen of the South Metropolitan Gas Company was held in the Cricket and Recreation Ground at the Old Kent Road Station. The field and its approaches bore a festive appearance.

Flags were flying, and bannerettes were strung from pole to pole; while around the platform and in other parts of the ground, flowering plants, ferns, and palms were tastefully grouped. It should be mentioned that the whole of the decoration work was carried out by the Workmen's Committee, who, in the course of the meeting, were complimented by the Chairman (Mr. George Livesey) on the pleasing aspect they had given to the place. There was a numerous attendance of men from the various works; and they were in most cases accompanied by their wives or sweethearts.

The proceedings commenced, shortly after three o'clock, by the Company's Old Kent Road Brass Band playing a few selections of music, during which those present assembled round the platform. On taking their seats on the latter, the Chairman, Mr. Simpson Rostron, Mr. John Ewart (Directors), Mr. Frank Livesey (Chief Engineer), Mr. Frank Bush (the Secretary), and the other officers of the Company, were loudly cheered.

The CHAIRMAN was the first to address the meeting. Having, on behalf of the Directors, welcomed the men, he apologized for the absence of the Deputy-Chairman (Mr. J. Mews), Mr. R. O. White, Mr. R. Morton, and Captain Heathorn—the first of whom had had a severe attack of influenza, and the other gentlemen were at present away from home. Through a little misunderstanding, the wives of the Directors and officers were also absent; but he assured the men that, if the ladies had for one moment thought their presence would have added to their enjoyment, they would have been with them. Proceeding, he asked what had brought that meeting about. Last year the men invited the Directors to meet them on that ground, to express their appreciation of the manner in which the bonus scheme had been conducted. That meeting was so pleasant, and every one seemed so happy, that the Directors thought they might repeat the experiment; and so they resolved to invite the men to a similar meeting that day. Of course, the profit-sharing scheme had a great deal to do with the original meeting; and here he should like to say a word or two about that, because things did not always go as one could wish. It was the hope of the Directors that they might be able to pull through these bad times of high-priced coal, without having to raise the price of gas. Unfortunately, after using up £200,000 of the reserve fund, which had been accumulating during the past 25 years, and after the shareholders had given up £50,000 of dividend, they found they could not go on without increasing the price. Consequently, notice had been given that it would be raised from Michaelmas next by 3d. per 1000 cubic feet. This increase in price would also affect the men. A few years ago it would not have made any difference to them at all; they then received a certain amount as wages whether the Company were in a prosperous condition or the reverse. Now, however, they were interested in the business, and for the last two years the Company had been able to give them a 5 per cent. bonus upon their wages, depending upon the price of gas. There were those who said when the scheme was started, "This will not last six months. The Company will have to raise the price of gas before the year is out; and then where will be the bonus?" But the Company had gone on two years since then, and now the price of gas would have to be raised; and instead of getting 5 per cent. on their wages, the men would only have 3 per cent. The raising of the price by 3d. would reduce the bonus to 2 per cent.; but they took the average of the year. It would be 5 per cent. for the first quarter, and 2 per cent. for the last three, which would work out to an average of 2¾ per cent.; but as they did not want to be troubled about quarters, the Directors would make it an average of 3 per cent. Now, this was a time of trial for the men, and for all connected with the Company. A time of trial came to every man; but when bad times came to the brave man, he said: "I will try and mend matters, and hope for better days." He (the Chairman) trusted this was the feeling that animated everyone present that day. The only thing to be done was to accept the inevitable; and try and do all they could to reduce the price, and get the bonus put up again. It was the desire of the Directors that all the men who stayed with the Company might look forward, when they became unable to work, to having something provided for them in their old age; and for this purpose they had lately been revising the superannuation fund rules, so that they might be worked to produce a greater benefit in the future than in the past. Reverting to the subject of the increase in the price of gas, the Chairman pointed out that the excessive price of coal had caused it; and the excessive price of coal had been brought about by the miners insisting upon being paid about 50 per cent. more wages than formerly. He saw it stated the other day that the coal miners of England had received about 9 millions of money in additional wages this last year or two. He did not grudge the miners good wages; but it was a matter which did not affect them alone. They had received 9 millions more, but others had got 9 millions less. Everyone connected with the South Metropolitan Gas Company was losing by it; and the whole of the consumers had to contribute their share. Speaking again of the bonus, the Chairman said he was sorry to find that some of the men had withdrawn their money. He had nothing to say against that. They had a right to do so if they chose; and if they took the money out, and put it into a building society, or something of the kind, well and good. But some, he was sorry to say, had drawn their money out, and then absented themselves from work for a week; and—well, he did not think he need say where the money went to. Men of that sort were a disgrace to their class; and such men should not be allowed to sign the agreement again. In conclusion, he asked the men to remember that, whatever might be done for them, the best thing was self-help; and that each one might do under the blessing of Providence. What the Directors and officers wanted to see was their people thrifty, temperate, and God-fearing men and women; and if they were that, then the Company had such servants as anyone might be pleased and proud of.

Mr. J. EWART, in the course of a few remarks, pointed out that, although the rise in the price of gas affected them all, it touched the consumers most, as they had to pay the additional 3d. per 1000 cubic feet. Of course, it affected the Company also; seeing that, although it did not actually reduce the dividends, it gave room for other forms of light to be employed, and so tended to diminish the consumption of gas.

Mr. SIMPSON ROSTRON congratulated the men on the fine day they had for their gathering; and he also alluded to the proposed increase in the price of gas. He said that the Directors would not rest contented with having raised the charge, but they would use every endeavour to reduce it again. A great deal, however, depended upon the men themselves; and he was sure they would do all they could to help the Directors to bring about what they desired.

Mr. F. LIVESEY said he could speak to the men in a threefold capacity—first, as a shareholder; secondly, as a fellow-workman; and thirdly, as one who took a large part in the management of the concern. As a shareholder, he did not think they would suffer much by the increase in price, except in this way, that he felt the stability of the Company depended upon the low price of gas. As a fellow-workman, he suffered in the same way as the others, because his bonus was also reduced. As the Chief Engineer, he wished to impress upon the men that they could do a good deal to help the Directors to reduce the price again. There was, for instance, a great deal of waste going on in the use of the various kinds of material; and each one could do something towards preventing that. Referring to the introduction of labour-saving appliances into the works, he said that this was not being done in any antagonism to the men; but really it was for their benefit, as the cheaper they could make and supply gas, the larger would be the increase in the business, and they would then have to employ more hands.

Mr. SURMAN, who has been in the employ of the Company during the past 40 years, addressed the meeting; and then

Mr. BROWN, the Engineer of the Rotherhithe works, was called upon by the Chairman. He remarked that, long before the Parliamentary Labour Commission was thought of, the labour question was settled, in the case of their Company, to the mutual satisfaction of employers and employed. In this the Company had shown its old pioneer spirit and policy; and it was something to be proud of.

Mr. BRAIDWOOD, the Surveyor of the East Greenwich station, spoke of the manner in which the men at his works now performed their duties. For over 30 years he had been among working men; and never, during the whole of that time, had he met a body of men who worked together better or more good temperedly.

Mr. BURROWS proposed, and Mr. COOLEY seconded, a vote of thanks to the Chairman, Directors, and officers for being present that day; and other representatives of the men—viz., Messrs. Davis, Sampson, and Cannicott—supported the proposition.

The CHAIRMAN having replied,

Mr. JOHN SOMERVILLE, the Engineer of the Bankside works, Mr. SIMS, and Mr. FRANK BUSH also briefly spoke—the last-named gentleman stating that the savings deposited by the workmen in the Company alone amounted to £4156; and the interest on that sum came to £111. Besides this, they had £2238 invested in the Company's stock; and he must say this reflected great credit on them.

After the large assembly had been photographed, the meeting concluded.

Nearly the whole of those present then had tea together in two large marquees, which had been erected in the field, and which were each calculated to hold about 1500 persons. Afterwards the brass bands from the Rotherhithe and Old Kent Road works performed selections of music; and later in the evening a concert was given, which was followed by a series of views illustrated by a limelight optical lantern. Throughout the evening the grounds were illuminated. It is scarcely necessary to add that in every way the meeting and entertainment provided were a thorough success.

CROYDON COMMERCIAL GAS COMPANY.

The shareholders of this Company will hold their half-yearly meeting to-morrow, when the Directors will submit a report of a very satisfactory nature. It states that during the six months ending June 30 last, there has been an increase in the quantity of gas sold compared with the corresponding period of 1890 of 20,187,500 cubic feet, which is equal to 10·37 per cent., besides which increased prices have been obtained for coke and tar. The subject of the probable increase in the cost of coal was mentioned in the last report; and the Directors have now the pleasure of stating that they have made a favourable contract for a supply of coal, to be delivered as required during the next three years. The alterations and additions to the plant at the Company's works, also referred to in the last report, have been commenced—*i.e.*, one of the gasholders is being enlarged by the addition of a third lift, and a new station meter and two new governors have been ordered. The balance of the capital account being £21 14s. 7d. only, the Directors have given notice that they will be prepared to receive tenders for 500 ordinary shares of £10 each under the provisions of the Croydon Gas Act, 1877. The report further mentions that there has been a large increase in the sales and supply on hire of gas-stoves for warming and cooking purposes; and a large number of cottages have been fitted up with gas-fittings and cooking-stoves, and supplied with gas under the prepayment system during the half year. The result of the six months' operations is an unappropriated balance of £19,620, out of which the Directors recommend the payment of dividends at the rate of 14 per cent. per annum on the capital of £51,600, and at the rate of 11 per cent. per annum on the capital of £137,500, less income-tax, for the half year. These dividends will amount to £11,174, and will leave a balance of £8445 to be carried forward to the credit of the next half-year's accounts. Turning to the revenue account, it is seen that the total receipts amounted to £44,242, of which gas produced £30,947; meter, stove, and fittings rental, £1187; residual products, £12,038; and rents of cottages, £69. The total expenditure amounted to £32,781; so that a balance remained to be carried to the net revenue account of £11,461. The amount of coal carbonized during the half year was 21,252 tons, and of cannel, 306 tons; the quantity of gas produced therefrom being 228,443,000 cubic feet.

The Purchase of the Andover Water-Works.—The Local Government Board have informed the Andover Town Council that they cannot see their way to extend the period for the repayment of the loan sanctioned by them for the purchase of the water-works.

ACCOUNTS OF THE SOUTH METROPOLITAN GAS COMPANY FOR THE HALF YEAR ENDED JUNE 30, 1891.

No. 3.—CAPITAL ACCOUNT.

Dr.

	£ s. d.	£ s. d.
To Expenditure to Dec. 31, 1890.	..	2,808,398 13 3
Expenditure during half year to June 30, 1891, viz.—		
New buildings and machinery in extension of works	33,557 0 11	
New and additional mains and services	15,613 0 9	
Do. meters	1,468 0 6	
Do. stoves	11,979 19 8	
		62,618 1 10
Total expenditure	..	2,871,016 15 1
Balance	..	190,049 4 11
		3,061,066 0 0

Cr.

Description of Capital.	Certified to Dec. 31, 1890.	Received since that Date.	Total to June 30, 1891.
	£ s. d.	£	£ s. d.
By A stock	500,000 0 0	..	500,000 0 0
B stock	1,350,000 0 0	..	1,350,000 0 0
C stock	166,500 0 0	33,500	200,000 0 0
Debenture stock, 5 per cent. .	678,000 0 0	22,000	700,000 0 0
	2,694,500 0 0	55,500	2,750 000 0 0
Premium capital	254,851 0 0	56,215	311,066 0 0
	2,949,351 0 0	111,715	3,061,066 0 0

No. 4.—REVENUE ACCOUNT.

To Manufacture of gas—		
Coals into store, including cost of petroleum spirit for enriching. (See Account No. 9)	£257,669 12 7	
Purification, including £5117 8s. 7d. for labour	10,280 19 4	
Salaries of Engineer, Superintendent, and Officers at works	5,202 15 1	
Wages (carbonizing)	56,507 17 7	
Repairs and maintenance of works and plant; materials and labour, less £1733 16s. 11d. received for old materials	42,686 0 9	
		£372,347 5 4
Profit-sharing for the 12 months to June 30		11,400 6 10
Distribution of gas—		
Repair, maintenance, and renewal of mains and service-pipes, including labour . . .	£13,732 3 2	
Salaries and wages of Officers (including Rental Clerks)	5,871 18 1	
Repairing and renewals of meters and stoves	6,843 8 8	
		26,447 9 11
Public lamps—lighting and repairing		6,218 3 10
Rents, rates, and taxes		18,546 12 1
Management—		
Directors' allowance.	£1,750 0 0	
Salaries of Secretary, Accountant, and Clerks	2,154 10 8	
Collectors	4,962 8 9	
Stationery and printing.	1,218 13 10	
General charges	2,401 14 7	
Company's Auditors	112 10 0	
		12,599 17 10
Law charges		3,114 8 4
Bad debts		1,797 14 5
Pensions and workmen's superannuation and sick fund . . .		2,319 14 2
Gas Referees and Official Auditor		265 3 2
Total expenditure		£455,056 15 11
Balance carried to net revenue account (No. 5).		88,682 0 10
		£543,738 16 9

By Sale of gas—		
Common gas (per meter) at 2s 3d. per 1000 cubic feet—		
Lady Day	£216,753 3 5	
Midsummer	126,140 6 7	
	£342,893 10 0	
Public lighting and under contracts (see Statement No. 11).	29,080 0 8	
		£371,973 10 8
Rental of 64,259 meters and 15,965 stoves.		10,859 14 10
Residual products—		
Coke, less £13,955 7s. 7d. for labour, &c. . .	£110,596 9 0	
Breeze, less £2213 19s. 2d. for labour, &c. .	1,988 7 4	
Tar, less £318 0s. 9d. for labour, &c. . . .	24,510 9 4	
Ammoniacal liquor, less £583 15s. 1d. for labour, &c.	22,303 14 11	
		159,399 0 7
Rents receivable		1,452 10 8
Transfer fees		54 0 0
Total receipts		£543,738 16 9

No. 5.—PROFIT AND LOSS (Net Revenue) ACCOUNT.

Interest on temporary loan and deposits	£1,637 1 4	
,, debenture stock	16,883 15 10	
Balance applicable to dividend on the ordinary stock	72,267 6 6	
	£90,788 3 8	

Balance from last account	£94,271 12 3
Reserve fund	35,610 4 2
	£129,881 16 5
Less dividend for the half year ended Dec. 31, 1890	129,881 16 5
Half-year's interest on reserve fund	1,744 0 8
Amount from revenue account (No. 4)	88,682 0 10
Interest on Bankers' balances	362 2 2
	£90,788 3 8

No. 9.—STATEMENT OF COALS.

Description of Coal.	In Store, Dec.31, 1890.	Received during the Half Year.	Carbonized during the Half Year.	Used during the Half Year.	In Store, June 30, 1891.
	Tons.	Tons.	Tons.	Tons.	Tons.
Newcastle coal.	45,630	333,741	344,995	255	34,121
Cannel coal	1,526	3,120	2,927*	—	1,719
	47,156	336,861	347,922	255	35,840

* 91,000 gallons of petroleum spirit used as a substitute for cannel.

No. 10.—STATEMENT OF RESIDUAL PRODUCTS.

—	In Store, Dec. 31, 1890.	Made during Half Year.	Used in the Half Year.	Sold in the Half Year.	In Store, June 30, 1891.
Coke—cwt.†	361,796	4,309,002	915,136	3,206,750	548,912
Breeze—yards	7,290	57,838	6,987	52,479	5,662
Tar—gallons	607,701	3,408,353	3,123	3,593,728	419,203
Ammoniacal liquor—butts. .	6,033	111,190	—	113,122	4,101

† 1 cwt. of coke about equals 1 sack of 4 bushels, under Weights and Measures Act, 1878.

No. 11.—STATEMENT OF GAS MADE, SOLD, Etc.

Description of Gas.	Quantity made.	Quantity Sold.			Quantity used on Works, &c.	Total Quantity accounted for.	Quantity not accounted for.	Number of Public Lamps.
		Public Lights (estimated).	Private Lights (per Meter).	Total Quantity Sold.				
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	3,449,176	309,415	3,070,275	3,279,720	38,319	3,318,039	131,137	18,731

No. 12.—BALANCE-SHEET.

To Capital—		
Balance—per account No. 3.		£190,049 4 11
Reserve fund—per account No. 6		114,449 0 2
Renewal fund—per account No. 7.		8,992 17 5
Insurance fund—per account No. 8		12,747 1 9
Net revenue account—for balance, per account No. 5		72,267 6 6
Debenture interest for amount due to June 30, 1891		16,883 15 10
Sundry tradesmen, for amount due for coals, stores, and sundries		51,030 11 2
Deposits by consumers		25,907 18 11
Dividend account (outstanding)		1,138 19 11
Debenture account ,, ...		0 8 10
Workmen's bonus and savings deposited with the Company . .		22,749 0 10
		£516,216 6 3

By Cash at Bankers		£84,459 6 7
Amount invested—		
Reserve fund	£93,656 8 4	
Renewal fund	8,862 1 1	
Insurance fund	12,715 6 3	
		115,233 15 8
Cash in hand for sundry payments		500 0 0
Stores in hand—		
Coals	£27,981 12 6	
Coke and breeze	16,222 5 2	
Tar and ammoniacal liquor	4,342 10 4	
Sundry stores	73,898 16 7	
		122,445 4 7
Accounts due to the Company—		
Gas meter and stove rental, quarter ending June 30, 1891	£146,116 10 6	
Arrears outstanding	2,087 17 7	
		148,204 8 1
Coke and other residual products		42,309 8 4
Sundries		3,064 3 0
		£516,216 6 3

BROMLEY CONSUMERS' GAS COMPANY.

The report and statement of accounts which the Directors will submit to the shareholders of the above Company at their half-yearly meeting on the 27th inst. show an exceptionally satisfactory result. The remarkable increase in the consumption of gas during the previous six months has been more than maintained; and as compared with the corresponding half year of 1890 exhibits an excess of no less than 12,250,000 cubic feet, or equal to 18 per cent. Unquestionably, a considerable proportion of this increase is due to the severity of the past winter and spring; but there can be no doubt that the balance not so accounted for shows much more than the average annual increase in consumption. From the same cause, the residual products have produced an increased return of even a larger percentage. At the profit and loss account, there is a balance of £7026; and the Directors recommend the declaration of dividends at the rate of 11½ per cent. per annum on the ordinary 10 per cent. shares, and 8½ per cent. per annum on the ordinary 7 per cent. shares, amounting together to £4921, and leaving a balance of £2104, of which they propose that £600 be added to the reserve fund and the remaining £1504 carried forward for the purpose of covering the decrease in the net profit of the current and ensuing half years, arising from a reduction of the price of gas from 3s. 3d. to 3s. per 1000 cubic feet, which theDirectors have determined to make as from July 1 last. The consumers will thus obtain a reduction to the extent of £900 on their bills for the current half year; and the Directors express the hope that, by dealing thus liberally with their customers, they will bring about such an increase in the consumption as will enable them to maintain this reduction in price with similar dividends. During the past half year, new and enlarged mains have been laid into the Chislehurst district; and these mains are being separated from those supplying Bromley and the western part of their district for the purpose of giving each area a better supply. Two new governors are being erected at the works to feed these mains; and a coal elevator and conveyor, with a hauling capstan for moving railway trucks about the works, are also being put down. By the use of this last-named appliance, it is estimated that there will be a very considerable saving, equal to 15 per cent. upon the outlay. The Directors remark that they have lately offered for sale by tender 400 new shares, of which 222 were taken up and allotted at an average price of about £15 7s. a share; and 107 of the remaining 178 shares have, up to the date of the report, been taken up by shareholders under the provisions of the Act, at the reserved price of £15 per share. Turning to the accounts accompanying the report, it is seen that the income of the Company amounted to £17,994, and the expenditure to £10,942. Of the former amount, gas produced £12,810; meter-rental, £309; residual products, £4671; and the balance was made up of small items. The sum spent under the various heads of expenditure was as follows: Manufacture of gas, £8905; distribution, £129; public lamps, £202; rates and taxes, £510; management, £1124; and the remainder consists of sundries.

THE GAS SUPPLY OF THE SALFORD OUT-DISTRICTS.

Last Wednesday, the *Manchester Guardian* published an article dealing with the above subject; and as it gives a tolerably clear view of the history and present position of the agitation in the Salford out-districts regarding the gas supply, it will be interesting to reproduce the principal portions: "Under their Act of Parliament," says our contemporary, "the Salford Corporation have power given to them to supply gas not only to the borough but to a number of the populous out-townships in the neighbourhood. Of this power they have to a large extent taken advantage. Their gas-pipes run through Swinton, Pendlebury, Eccles, and other out-townships. The inhabitants of these townships, originally thankful to Salford for doing for them what the heavy capital charges might have hindered them from doing for themselves, have felt for many years that their dependence on Salford for their gas supply has not been an unmixed boon. For one thing, they have thought for a long time that the price they had to pay for the gas was much higher than the circumstances warranted. The high charge was due to some extent to lax management, of which the Hunter frauds were one of the results; and the dwellers on the outskirts of the borough felt that it was hard that they should be penalised for that which they were powerless to prevent. They have felt still more keenly, however, the injustice, as they regard it, of their being called upon to pay a large differential rate for the gas they consume. Many deputations have waited upon the Corporation from time to time with the view of securing the abolition of the differential rate; but their efforts have not been attended with success. Not long ago, it is true, the differential rate was reduced from 6d. to 4d. per 1000 cubic feet; but the Gas Committee, which represented the Corporation in the matter, would never go the least bit near admitting that the charging of a differential rate was unjustifiable. The ratepayers of Salford, it was said in effect, were the owners of the gas-works, in which they had sunk a great deal of money; and in selling gas to outsiders, who had no financial responsibility in connection with the gas-works, they were entitled to a fair margin of profit. To this the reply of the gas consumers outside the borough has been, and is, that although not nominally part owners of the gas-works, they have in reality as great a financial responsibility in connection with the works as the ratepayers of Salford, inasmuch as they have to pay a higher price for gas in order to meet the deficiency brought about by the Hunter frauds or any other untoward event in the history of the undertaking. From time to time there have been complaints with regard to the poor illuminating power and the impurity of the gas; but the differential rate, it may be said, has constituted the head and front of the Salford Corporation's offending. It is on this question that the agitation now in progress turns. During the time Hunter was supposed to be in charge of the gas-works, he devoted much of his attention to hunting in Cheshire; and some of his spare time he filled up in the collection of eighteenpence a ton on the coal and cannel consumed in the gas-works. So long as the hunting and the collection of the commissions were attended to, he did not mind whether the gas-works went to wreck and ruin. When the new Gas Committee and the new Manager (Mr. Shoubridge) entered upon their duties, they found the works in a sad state of dilapidation; and it was soon seen that an expenditure of £130,000 or so would be needed to put them in a satisfactory state of repair, and to make them equal to the ever-increasing demand for gas both in and out of the borough. When the customary preliminaries had been got through, the Corporation went to Parliament for power to borrow the requisite sum of money; and it was at this point that some of the local boards, representing the greater portion of the out-districts, determined to make an effort either to secure permission to make their own gas, or to compel the Corporation to take a more reasonable view in respect to the differential rate. When the Bill came before the Select Committee of the House of Commons last month application was accordingly made to have a clause inserted 'providing that the Corporation would not oppose an application by the Local Boards to Parliament for powers to supply their own districts with gas, excepting for the purpose of Salford obtaining full compensation, by arbitration in the usual way, for loss.' The representatives of the Corporation were not long in perceiving that they could not hope to successfully oppose the application; and after much deliberation an agreement was arrived at." (See *ante*, p. 71.) "It is reported," but with what authority our contemporary is unable to say, "that since the understanding was come to, the Gas Committee of the Corporation have seen fit to considerably modify their views with regard to the differential rate; and there can be no doubt that a large section of the inhabitants of the out-districts would hail with satisfaction any prospect of coming to terms with the Corporation. Be that as it may, an agitation has been already begun for the establishment of gas-works to manufacture and supply gas to the out-districts. Next to the question of whether new gas-works shall be erected at all, the question for the ratepayers appears to be whether there should be one set of works for the Eccles Local Board district and another for the Swinton and Pendlebury Local Board district, or whether joint works should be erected. The erection of joint works finds favour at Eccles. In the Swinton and Pendlebury district, opinion appears to be about equally divided on the point; but there is to be an opportunity for further discussion of the matter at a public meeting of owners and ratepayers. Mr. Corbet Woodall, Consulting Gas Engineer, whose services have been secured, expresses the opinion that either with separate or joint works it will be possible to supply gas at less than is charged by the Salford Corporation. But he strongly recommends, on grounds of efficiency and economy, the construction of joint works, and states that over and above the saving of a sum equal to the present differential rate of 4d. per 1000 cubic feet, an income of about £3500 would thereby be secured for the two districts. He further reports that, in the event of separate works being built, Eccles could supply gas at 3d. per 1000 cubic feet less than Swinton, on account of the larger consumption in the Eccles district. He thinks there would be no difficulty, starting with a basis of equal representation, in forming a Gas Board that would secure the rights of both Local Board districts. If some such arrangement should be found practicable, the two Local Boards will endeavour to take in along with them the other portions of the districts which are at present within the Salford gas supply area; but in this it seems probable that they will meet with some opposition. The Prestwich Local Board has from the first stood aloof from the agitation, and what course it will take now remains to be seen. The Little Hulton Local Board have already met; but no definite decision was arrived at—they are apparently waiting for more information. The Barton Rural Sanitary Authority (which deals with Clifton, Walkden, Worsley, Cadishead, and Irlam) seem disposed to join Eccles and Swinton, if acceptable terms can be arranged. There is every indication, therefore, that if it is not nipped in the bud by the Salford Corporation coming to terms with the out-districts, the agitation which has been set on foot may prove somewhat lively, and perhaps not a little protracted."

Last Wednesday evening, the public meeting of the ratepayers and owners of Swinton referred to above was held. The Chairman of the Local Board (Mr. H. Lomax) presided. Mr. J. Gerrard first addressed the meeting; and said that at present Swinton and Pendlebury were paying Salford 2s. 8d. per 1000 cubic feet for gas, while consumers within the borough were only paying 2s. 4d. The extra 4d., he remarked, was a loss to the district of between £7000 and £8000 per annum. At the same time the Corporation of Salford were making gas at a cost of not more than 2s. per 1000 feet; and during the past ten years they had divided among themselves £162,000 of profits. Under those circumstances, the Swinton Local Board had decided to apply for power to make their own gas, subject to the approval of the ratepayers. Should they, he asked, try to obtain gas-works of their own, or amalgamate with Eccles? They would find several disadvantages following an amalgamation with Eccles; and altogether he thought the advantages would be on the side of Swinton if they possessed works of their own. Mr. Hampson controverted some of the statements made by Mr. Gerrard, and expressed surprise at the assertion that it was considered best for Swinton to have gas-works of their own. He thought the advantages were all on the side of joint works with Eccles. Mr. Knowles remarked that Eccles was able to supply gas for 3d. per 1000 feet less than Swinton could on account of its larger consumption; the present supply to Eccles being 76 million feet, while that of Swinton was only 46 million. If they found that Salford did not approach them, he thought they should stick to Eccles. He believed, however, that Salford would approach them; and, if they took off the differential rate, and lowered the profits, he considered the result would be a very satisfactory one. A somewhat heated discussion followed; and ultimately the meeting was adjourned, on the understanding that the question should be further discussed to-day (Tuesday)—a strong opinion being expressed that the Board ought then to present some proposal to the ratepayers.

On the following evening, a meeting of the ratepayers in the Pendlebury district was held; and a resolution was passed, expressing the opinion of those present that it was desirable a Bill should be promoted next session by the Swinton and Pendlebury Local Board, in accordance with the clause inserted in the Provisional Order of the Salford Corporation.

DUMFRIES CORPORATION GAS SUPPLY.

The Position of the Gas Undertaking.

The fact that the gas undertaking of Dumfries was the first (practically, if not actually) to be taken over by the Municipal Authority under the Burghs Gas Supply (Scotland) Act, 1876, always lends considerable interest to the financial statements which are annually made to the Gas Commissioners; and, owing to the circumstances connected with the increased cost of coal for gas making, the particulars submitted to the last meeting of the Commissioners, on behalf of the Gas Committee and the Gas Manager (Mr. George Malam), are specially worthy of notice. Provost Scott moved the adoption of the Committee's minutes, in which was the unanimous recommendation that the price of gas and discounts should be continued for the current year. In the course of his remarks, he said that the economy they could exercise by means of the new retort-bench (on Mr. Hislop's system), and in other ways, would enable them to pay 1s. 7d. more per ton for coals, and yet keep the gas at the same price. He thought Mr. Malam deserved great credit for the economy he had exercised. Mr. Currie, in seconding the motion, said he thought that the report would be satisfactory not only to the Gas Commissioners, but also to the public; as a consideration of the price paid for gas in other towns would show that it was almost an impossibility to keep it at 3s. 6d. per 1000 cubic feet. The cost of coals during the year ending May 15, 1891, was 16s. 7·8d. per ton. Mr. Malam, when framing his report in July last year, estimated it at 16s. 6d., and to produce 10,000 cubic feet of gas per ton of coal; whereas the average yield had been 10,047 cubic feet. The railway strike gave much annoyance by the delay in forwarding supplies; and considerable difficulty was experienced by the contractors in completing the orders for cannel. It was therefore quite expected that the average cost of coals would have been more than 16s. 7d. per ton. The amount borrowed on mortgage from time to time since the year 1878, when the Corporation acquired the gas-works from the old Gaslight Company, had been £33,000. There had been paid off by the sinking funds during the 13 years the sum of £9717; thus reducing these loans to £23,283. The amount being paid into the profit and loss account was £2328, without considering any balance left afterwards. This alone would be a return of 10 per cent. upon the £23,283 at present owing on the loan capital. Even if the whole amount had been borrowed—viz., £33,000—on mortgage, there could be shown a return of 7 per cent., without regarding any profit afterwards. To show how the consumption of gas had increased, he might state that, in the first year's management by the Corporation (1878-9), the quantity sold was about 25 million cubic feet, and the price charged to the ordinary consumers was 5s. 10d. per 1000 cubic feet. During the year ending May 15, 1891, the consumption had been rather more than 49 millions, and the price charged was 3s. 6d. The consumption of gas had therefore almost doubled itself in 13 years. Since 1878-9 the prices had been as follows: 5s. 10d., 5s., 4s. 2d., 3s. 9d., and now 3s. 6d.; while meter-rents, formerly charged at 2s. 6d. per annum, had been entirely abolished since 1880—representing a saving of fully £2000 in eleven years, in addition to the difference of the price of gas. The new retort-bench had added considerably to the success of the works during the past year. After some discussion on the question of discounts, the motion was adopted.

Mr. Malam's report stated that the quantity of coal carbonized during the year was 5766 tons, at an average cost of 16s. 7·8d. per ton; as against 5243 tons at an average cost of 13s. 11d. per ton in the preceding year. The quantity of gas manufactured was 57,993,600 cubic feet, or an average of 10,047 feet per ton, as against 53,592,700 cubic feet, or an average of 10,221 feet per ton, in the preceding year. Including the coals used on the works, the quantity of gas sold or accounted for was 49,882,885 cubic feet, or an average of 8651 feet per ton; as against 47,392,400 cubic feet, or an average of 9039 feet per ton, in the year 1890-91. The new retort-bench that was erected on the regenerative system last year, at a cost of £1356, had been continuously working since September, and had proved more profitable than was anticipated. Mr. Malam estimated that 6000 tons of coal might be required for the current year, at an average cost of 18s. 1d. per ton; and that there would be a total outlay of £10,879. His estimate of the income for the year was £8690 for gas sold, £2131 for residual products, and £58 for rents and the hire of gas cooking-stoves; making a total of £10,879.

PAISLEY CORPORATION GAS SUPPLY.

Financial Statement for 1890-91.

The Gas Committee of the Paisley Town Council have submitted to the Corporation their annual balance-sheet, from May 29, 1890, to May 28, 1891. In their report, while dealing with the question of finance, they say that the gross revenue amounted to £39,120, and the gross expenditure to £27,799; the balance of profit and loss being £11,321. Out of this, interest and the addition to the sinking fund (£3082) were met; leaving a surplus for the year of £8239. The balance from last year's account was £16,757, out of which has been paid for public improvements, &c., £1963; and voted to the credit of extension account, £2000—together, £3963—leaving £12,794. Adding to this the above surplus of £8239, there was at the credit of the profit and loss account on May 28, 1891, the sum of £21,032. The Committee report that no extensions were carried out during the past year, beyond that of the completion of the new gasholder in course of construction at the date of the previous balance, and which was finished and inaugurated on Dec. 23, 1890. They also remarked that the erection of the second section of additional coal-stores, together with the construction of a branch railway through them, has been deferred for another year. In this connection, however, it is worthy of note that, in response to the representations of the Committee for improved traffic facilities, the Glasgow and South-Western Railway Company are at present constructing an extensive mineral depôt in close proximity to the gas-works, which will prove to be an advantage to the Corporation. All other departments of the works (which are under the management of Mr. G. R. Hislop) have been maintained in good condition, as usual; the expenses being paid out of revenue.

The quantity of gas sold and accounted for during the year amounted to 225 million cubic feet; while the unaccounted-for gas was 11·56 per cent. Continuing the year's statistics, the report states that the average illuminating power of the gas delivered to the consumers was 27 standard candles; and the rate charged, 2s. 10d. per 1000 cubic feet to ordinary consumers, and 2s. 6d. to the Police Commissioners for the public lamps. During the year, 5968 yards of main and service-pipes were renewed. The number of meters now in use is 14,366; while in the past twelve months 1485 meters were sent out, 1015 brought in, and 757 thoroughly repaired. Under the head of "Manufacture of gas," the gross expenditure on coals for the past year is set down at £14,132, which is brought up to £22,070 by outlays for purifying materials, &c., salary of Manager at works, wages of officers and workmen, repairs and maintenance of works, plant, &c. For the distribution of gas the outlay was £2554; and the total expenditure was £27,799. The sales of gas show a revenue of £31,408, which is reduced to £31,264 by writing off a small sum as irrecoverable. For meter-rents and the hire of gas-stoves the income was £896. Including the stock of coke unsold, the residual products yielded £6916. Lastly, there is a sum of £43 set down for the fee fund. Collectively, these items give a gross revenue for the year of £39,120; thus showing (as previously mentioned) a balance of £11,321, which is carried to the profit and loss account. Not much requires to be said regarding this account and the general balance. The former shows a balance of £24,115, which is carried to next year's account; and the latter, cash in the bank, in the shape of sinking fund, amounting to £10,609, including an addition of £500 made to it during the past year.

THE BELFAST CORPORATION AND GAS AND ELECTRIC LIGHTING.

The Proposed Extension of the Gas-Works.

Last Friday week, the Belfast Town Council held a meeting in Committee—the Mayor (Mr. C. C. Connor) presiding—for the purpose of considering various matters; two of them having reference to the suggested electric lighting installation for the city and the extension of the gas-works. It was decided at the outset to postpone, until the following Tuesday, the discussion of the first subject, and to proceed with the consideration of the second. A report respecting the site for the proposed new gas-works was submitted by the Mayor. It stated that the necessity for additional gas-works to meet the growing demands of the city had been frequently brought under the notice of the Gas Committee and the public, and had been the subject of several reports from the Manager of the works (Mr. J. Stelfox). Various causes had combined to keep this important question in the background; the chief obstacle having been the supposed danger of the electric light becoming so generally in demand as to render the establishment of additional gas-works unnecessary. Year after year had, however, passed without the slightest appearance of justification for this fear; and the demand for gas had so largely increased that it had become a source of the greatest anxiety to discover how it was to be met in the near future. The existing appliances were pressed to inconvenience to meet the requirements of the moment; and the new retort-house, now in course of erection, would only represent a very temporary relief as regarded the manufacture of gas, while it would enormously increase the congestion which already existed in the works. This state of affairs was neither desirable nor profitable. Parliamentary powers would be required before new ground could be obtained; and it would take quite three years to build new works. It was, therefore, most desirable that there should not be any further delay in making the necessary arrangements for them. There was the most urgent need for prompt action if the Gas Committee were to carry out their statutory obligations. So long ago as November, 1880, the Manager submitted a report to a joint meeting of the Gas and Parks Committees as to the need for extension of the gas-works, and the suitability of ground in Ormeau Park for that purpose. The recommendations therein contained were so far approved of that the ground referred to was staked out; but the electric light scare prevented any immediate action being taken, and up to the present time no decided move had been made to carry out the scheme. Some figures were next given in the report to show the great progress which had been made by the gas undertaking. The gas supplied in the closing year of each decennial period since 1852 was as follows: Year ending June 30, 1852, 87,870,000 cubic feet; 1862, 173,939,000 feet; 1872, 410,000,000 feet; 1882, 614,791,000 feet. The average of the above increases showed that the make of gas was doubled in each ten years; and there seemed every prospect that these rates of increase would be maintained—the consumption of gas for each year since the close of the last decennial period being as follows: For the year ending June 30, 1883, 648,786,000 cubic feet; 1884, 665,470,000 feet; 1885, 718,559,000 feet; 1886, 760,339,000 feet; 1887, 787,493,000 feet; 1888, 853,154,000 feet; 1889, 907,387,000 feet; 1890, 978,233,000 feet. The consumption for the current year would considerably exceed 1000 million cubic feet. Since the Committee were first told that the day of gas lighting was gone by, the demand for gas had more than doubled; and the only injurious effect produced on the gas undertaking by the electric light had been the delay in providing new works. The necessity for such new works being apparent, the next thing to be considered was the site on which they were to be erected. For this purpose, the report stated, the ground already referred to in Ormeau Park would be most suitable—for reasons fully set forth. A discussion of considerable length followed the reading of the report; and finally it was unanimously resolved that the further consideration of the report should be adjourned *sine die*, in order to enable the opinion of gas engineering experts to be had as to the suitability of the Ormeau Park or any other site for the extension of the works.

Last Tuesday the Council again met in Committee, when they had before them the report of the Sub-Committee of the Gas Committee on the subject of electric lighting. The Committee commenced their report by giving an account of the visits they had paid to various electric lighting stations in London; and then they stated that the most sanguine of their informants connected with the electric light

admitted that electricity could not compete, as far as economy was concerned, with cheaper gas than 4s. 6d., while others put it down as high as 6s. per 1000 cubic feet. On account of the absence of accurate details as to the prime costs, and the cost of production, the Committee had not yet made up their minds what system to advise the Corporation to adopt in the district proposed to be lighted; but from what information they were enabled to obtain in the absence of a distinct specification, they felt justified in stating that the cost of a generating station for 10,000 lights of 60 watts each would be at least £35,000. This sum would be sufficient only to provide for the requirements of a small district of the city, no matter what system was adopted. In addition to this, of course, there would be the cost of the distributing mains through the streets, which would vary according to circumstances, but was estimated by competent authorities to be about £1 per running yard for the cost of the cable and opening and closing the streets. The Committee suggested the continuance of their investigations, with a view to getting information on these points before recommending the Council to ask for tenders. The Mayor, who was Chairman of the Committee, in the course of his remarks, showed that electricity would be more expensive than gas. The present price of gas per 1000 cubic feet (which was 2s. 2d. for mills and 2s. 9d. to private consumers) would be represented in electricity at 4s. 6d. The limit laid down by Parliament to be charged by Corporations or other public bodies for electricity was 8d. per unit; but he hoped that if in Belfast they came to the conclusion to light a certain area, the cost would not exceed 7d., and after two or three years it might be reduced to 5d. He explained that 7d. per unit of electricity would represent 5s. per 1000 cubic feet of gas. After considerable discussion, during which the opinion was freely expressed that electricity, for the present, could only be looked upon as an expensive luxury, except in positions where gas was not wholly serviceable, the report was adopted, and the Committee were requested to continue their investigations.

GAS AND ELECTRIC LIGHTING AT CAMBRIDGE.

In the JOURNAL for the 4th inst., we briefly noticed the proceedings at the half-yearly meeting of the Cambridge University and Town Gas Company which was held, under the presidency of Mr. C. Balls, on the previous Thursday. In the course of his remarks when moving the adoption of the report, the Chairman glanced over the work of the Company during the twelve months ending June 30 last. Taking first the price of coal, he stated that it had advanced 1s. 4d. per ton as compared with the six months of 1890; being now 17s. 6d. per ton. The increase in the consumption of gas in the year had been nearly 7 per cent. The Directors had undergone a great deal of anxiety in respect of the price of their raw material; and they hoped that the coal market was about to settle down in a reasonable way. But there was one article in the market which had advanced very much in consequence of the demand upon it, and the expectation of a short supply, and that was cannel. This was a matter which caused some anxiety to the Manager (Mr. Duesbury). Many gas-supplying corporations had been obliged to increase their charge for gas in consequence of the high price of coals. In Liverpool the Company had raised it 4d. per 1000 cubic feet; and in some places he was informed that they had been obliged to consent to reduced dividends on account of the difficulties they had to contend with. They had had the same troubles in Cambridge, but the Directors proposed to pay the full dividend; and if it had not been for the advance in coals, and other matters, they would not require to take from their reserve what he considered a very small sum to make up the amount. Turning to the report presented by the Manager, he called attention to the remarks in reference to the letting of cooking-stoves on hire. The result of the gas exhibition held in the Corn Exchange in May last was that up to Midsummer they had let 48 stoves on hire, and the number was increasing. Reverting to the position of the Company, he mentioned that in the two years ended Midsummer last they had earned £461 more than was required for the dividend, besides the cost of the assessment appeal. He reminded the proprietors that Mr. Duesbury was appointed Manager about two years ago; and he thought it was only fair to bring before the meeting the result of the working during the subsequent period. He found that the profits in the half year ending Christmas, 1889, were £4251; Midsummer, 1890, £4884; Christmas, 1890, £3430, and Midsummer, 1891, £3995. The dividends paid during the same period were; 1889, £3924; 1890, £4007; 1891, £4048. So the balance of profits over dividends paid in two years was £641. He thought the management had something to do with this. At a later stage of the proceedings, he made some remarks on the subject of the electric lighting scheme of the Corporation. He said that when the Local Government Board Inspector was inquiring into the application, he (the Chairman) had an opportunity of expressing his opinion upon it; but he carefully abstained on all occasions, at both Council and Committee meetings, from discussing the question, or voting thereon. But he began to take a different view. When he found that they, as shareholders of the Company, paid rates amounting to £1788 per annum, he thought it was a matter in which they were all deeply interested. In his own opinion, the Electric Lighting Committee were going ahead very rapidly. They had had no authority from the Local Government Board to raise £30,000. But they were laying out the money; and he could tell the shareholders how much they had spent. He had been auditing the Corporation accounts; and he found that the Committee had already expended £1236. How long was this to go on? He was only astonished that there was not a man of sufficient spirit to ask the ratepayers whether the Committee had their consent to carry the thing on in this reckless way. There was nothing to prevent Trinity College, St. John's College, or any other college, or a private individual, indulging in the luxury of electric lighting; but was it right that the ratepayers should have their money embarked in a speculating scheme? They had had held out to them that it would be a great profit to the town; he thought people had gone so far as to say they would be able to do without rates. Well, they might be very clever; but he had never heard anybody who had approached anything of that sort. The shareholders had nothing to fear from the electric light. He could see that they would have their dividends; and he knew that their property was a very valuable one. They knew the worth of their stock, and they would stick to it. He remembered that when Barnet took up the electric light it was called "Brave little Barnet;" but the people of Barnet had come to their senses at last, and had thrown over the electric light, and gone back to gas.

DESTRUCTION OF A GASHOLDER IN AMERICA.

According to the *American Gaslight Journal* of the 27th ult, a very mysterious explosion case has occurred at Rochester, N.Y., where, at midnight on July 15, a gasholder of the Municipal Gaslight Company, located on the Canal Street plant, was badly shattered by what undoubtedly was an explosion of gas. The holder had been out of action for something like two weeks; having been let down for the purpose of making some needed repairs to the tank. These had been completed 24 hours before the explosion took place—in fact, the tank was being refilled. Everything appeared to be going along smoothly (the water-works department placed a man in charge of the hydrant from which the tank was being filled, with instructions to turn off the current in case the fire-bells proclaimed a fire), when that portion of the city in which the holder was located was suddenly disturbed and bewildered by an explosion of great violence. The holder crown was completely destroyed, as was the trussing, while the columns suffered slight injury. The force and direction of the explosion were almost entirely upwards; none of the fragments of the crown having been discovered at a distance of 50 yards from the side sheets at any point. Two men were killed by the explosion, one of whom was the Company's night watchman, the other the captain of a canal boat, whose vessel was lying in the canal which winds along close by the holder side. The latter was killed by a blow from a flying fragment of iron. At the time of writing, our contemporary had not received the testimony brought out at the inquest; but it looks as if the inlet-valve to the holder, which was still in direct line with the producing plant of the works, either leaked or had been slightly moved from an "off" position. In the meantime, the watchman was making his round, carrying with him a lighted lantern; and it seems it was his habit to lower the lantern through the holder manhole with the object of determining how high the water had risen—and following his risky style of satisfying his curiosity, paid the penalty. This is the most reasonable explanation of the affair that can at present be given; but a complete account of the mysterious affair is promised. The value of the holder is put at $60,000.

The Lighting of Penzance.—The Lighting Committee of the Penzance Town Council reported to that body last Wednesday that they thought the time had arrived when it was advisable that the lighting of the borough should be in the hands of the local authority. After having thoroughly considered the respective merits of gas and electricity and the probable cost of obtaining the necessary Orders, acquiring and erecting plant, they recommended that in the forthcoming session, application should be made to the Local Government Board for powers to supply gas. After a long discussion, the report was referred back to the Committee for reconsideration.

Damages against the Whitchurch Gas Company.—At the recent Winchester Assizes, before Mr. Justice Cave, a case was tried in which the plaintiff (Mr. G. Beckingham), a threshing machine proprietor, of Southington, sued the Whitchurch Gas Company to recover £500, damages for injuries alleged to have been sustained by him and the mare he was riding, owing to the condition in which the road leading to Laverstoke, in the town of Whitchurch, was left by the Company. Mr. Bullen appeared for the plaintiff; and Mr. Bucknill, Q.C., for the defendants. In defence it was pleaded that the road was not in a dangerous state, and that the plaintiff might have avoided the accident by the exercise of reasonable care. The hearing of the case occupied a long time, and many witnesses were called. The jury found for the plaintiff for £100, and a verdict was entered accordingly.

The Increase in the Price of Gas at Liverpool.—The Watch Committee of the Bootle Town Council have lately sent in a protest to the Liverpool Gas Company against the advance which they have recently made in the price of gas. The resolution which they passed on the subject was as follows: "That the Committee have received with surprise and regret the announcement by the Gas Company of an advance equivalent to 12½ per cent. in the price of gas; that the Committee are not aware of any sufficient reason to justify the large increase of price, which appears to them both unnecessary and exceptional; that the rate for the purposes of public lighting having been laid for the current year, the advance at the present time which has been made without sufficient definite notice will result in much inconvenience to the Corporation; and that this resolution be communicated to the Gas Company as a respectful protest on behalf of the gas consumers and ratepayers of the borough." The minutes of the Committee embodying this resolution were confirmed at the meeting of the Town Council last Wednesday.

A Child Killed by the Fall of an Electric Lamp.—Last Thursday, an inquiry was held at St. Bartholomew's Hospital, London, touching the death of Kate Wilkins, aged five, the daughter of a watch-case maker. Emily Wilkins, a little girl, said that the deceased was her sister. As they were passing by the Agricultural Hall on the 28th ult., the electric light lamp which was hanging over the entrance gave way, and fell on to the deceased, striking her to the ground and rendering her unconscious. She was at once conveyed to the hospital, where she had since died. The lamp was produced in court, as was also the wire by which it had been suspended. Mr. F. Trickett said that he was an electrician, and had charge of the electric lighting apparatus at the hall. He attributed the accident to a leak in one of the wires, which had resulted in the current "taking to earth" and going to the stone coping. As a result the wire was burnt clean through, causing the lamp to fall. The wire was found to be hot after the accident occurred. The lamp was not alight at the time; but the electricity had found its way through the building from the switch 200 feet away. A verdict of "Accidental death" was returned.

PROVINCIAL GAS AND WATER COMPANIES.

The season for the half-yearly meetings of gas and water companies has again come round; and already paragraphs have appeared in the JOURNAL recording the results of the working during the past six months of several of them. As, however, financial statements and reports of meetings of provincial companies are now reaching us in greater numbers, we shall, in the next few issues, as in previous half years, briefly notice them under the above heading.

Gas Companies.

The half-yearly meeting of the Calverley and Horsforth Gas Company was held last Tuesday. The Chairman (Mr. W. Cheetham) said the Company had had to meet an extra cost for coal over the corresponding half of last year to the extent of £491, equal to an increase of 42½ per cent. But this extra cost, the Directors were happy to say, had been met by the large increase that had taken place in the gas and meter rental and in the amount received from the sale of residuals. Before many days they expected to be in a position to send gas through their new mains to Newlay, which would at once lead to an increased consumption. The entire rebuilding and refitting of the principal retort-house was approaching completion; and it would probably be some years before such an extraordinary outlay would be again called for. The report and balance-sheet were unanimously adopted; and dividends at the rate of 10 per cent. on the original, and 7 per cent. on the later issues were declared.

The abstract of the accounts of the Chesterfield Gas and Water Company for the past six months (which was presented at the meeting of the shareholders last Friday) showed that the total income had amounted to £9013; and deducting from this the expenditure, a balance of £4811 remained to be carried to the net revenue account. The sum available for distribution among the proprietors—including £1211 brought forward—was £5599; being £389 in excess of the amount at the corresponding period of last year. On the recommendation of the Directors, a dividend of 2½ per cent., less income-tax, was declared.

The half-yearly meeting of the Chester United Gas Company has been held, at which the report of the Directors was adopted, and resolutions passed declaring an interim dividend at the statutory rates out of the balance of £4796 to the credit of the profit and loss account. From the report it appeared that notwithstanding the increased cost of coal in the half year compared with the corresponding period of 1890, and the extra discount allowed to consumers, there was a small additional balance carried from the revenue account to the credit of the profit and loss account. This result was owing to a large increase in the gas-rental, occasioned by an unusual prevalence of dark and cold weather, as well as to the growing use of gas apparatus for heating and cooking purposes; and also to a better return from the sale of coke.

The half-yearly meeting of the Cork Gas Consumers' Company was held last Thursday—Mr. T. Mahoney in the chair. In their report, the Directors expressed regret that the accounts did not show such a favourable balance as usual—a result to be attributed mainly to the great increases which had taken place in the cost of coal and in the rate of wages. It was fortunate that the Directors had, before the advance, made contracts for coal at low prices; otherwise the result would have been more unfavourable. They were glad to inform the shareholders that these contracts were not yet exhausted; and, the cost of coal having now fallen, they had made further contracts which would enable them to work with more favourable results than was a short time since anticipated. The rental from private consumers exhibited a small increase of £148. The additional cost of coal had been no less than £1638. Wages and wear and tear had also increased considerably; but, on the other hand, residual products produced £981 in excess, and nearly every one of the charges in the profit and loss account was less than last year. The Directors also stated that the 100-foot gasholder erected in 1857 required a thorough re-construction of the cup, the grip, and other parts. The work had been nearly completed by the contractors; but the cost was not yet included in the accounts. This would be charged to the depreciation account. Having mentioned that the Irish House-to-House Electric Company in 1890 for a second time lodged with the Corporation a notice of their intention to apply for an Electric Light Order, but that they did not lodge the Draft Order in the time limited, the Directors remarked that, acting under the best legal advice, they had given the Corporation notice of their intention to apply for a similar Order; but before taking any decisive step in the matter, they promised to call the shareholders together and consult them on the subject. They pointed out that in America a great many, and on the Continent several gas companies supplied the electric light also; and if any considerable number of the citizens of Cork desired this mode of illumination, the Gas Company could provide it more economically than any separate company (with a second staff, offices, &c.) could possibly produce it. Whether such an extension of the Company's trade would be profitable or not, would depend on the extent to which the new light would be adopted. The balance of profit and loss amounted to £4887; while the ordinary dividend at the rate of 8 per cent. required £5701. It would, therefore, be necessary to take £813 from the reserve, which would then stand at £11,638, or £578 less than this time last year. The report was adopted, and the dividend declared.

Last Tuesday, the half-yearly meeting of the Dorchester Gas Company was held, when the Directors had the pleasure of reporting to the shareholders that there had been an increase in the consumption of gas during the past six months of 346,200 cubic feet, as compared with the corresponding period of last year. The rise in the price of coal, however, had largely increased the cost of production; and the Directors had, therefore, transferred £100 from the reserve fund to the net revenue account, to enable them to recommend the payment of a dividend of 11 per cent., less income-tax, on the ordinary, and 6 per cent. on the preference shares. The revenue account showed that the total income from all sources during the half year amounted to £2940, of which the expenditure had absorbed £2122—leaving £817 to be transferred to the net revenue account. The balance at the credit of the latter available for division was £1066.

The Kegworth Gas Company, though only a small concern, appears to be in a very prosperous condition. At the recent meeting of shareholders a dividend of 10 per cent. was declared, after which it was resolved to reduce the price of gas by 3d. per 1000 cubic feet from September next.

The annual general meeting of the Kidsgrove Gas Company has recently been held, under the presidency of Mr. J. Gater. The Secretary (Mr. T. Wardle) read the report of the Directors, which stated that the moderate increase in the sales of the gas noticed last year still continued. The figures were 13,495,000 cubic feet this year, against 12,514,000 in 1890. At the same time, the high price of coal pressed heavily on the profits of the Company. The steady increase in the consumption of gas had brought prominently before the Directors the desirability of re-modelling and enlarging the working plant. The opinion of Mr. T. Newbigging, C.E., had been taken; and when the necessity for re-construction arose, the Directors would be able to deal with it in a satisfactory manner. Three new beds of retorts were in course of erection; in addition to which the Directors had just ordered one of Walker's patent gas-washers, and were improving the purifying plant generally, in view of increased consumption of gas during the coming season. Mr. Mitton, after about ten years' service, having resigned his position as Manager, the Directors had filled the vacancy by the appointment of Mr. Shires, who entered upon his duties in May last. The report was adopted; and dividends of 10 and 7 per cent., as usual, were declared.

It was reported, at the annual meeting of the Maidstone Gas Company last Thursday week, that the profit for the year ending June 30 had amounted to £6672. In addressing the shareholders, the Chairman (Mr. A. Warde) observed that the amount the Company had made during the twelve months was not sufficient to pay the dividend; but nevertheless they had £12,531 in hand which had accumulated from time to time, and to this sum they would now have recourse. The half-year's dividend would amount to £3918; leaving a balance on the profit and loss account of £8613 in favour of the Company. They had had a crisis to go through in the matter of the price of coal; and the Directors had under consideration last Christmas whether they should increase the price of gas; but they felt that they had this balance in hand, and that it would not be necessary to make any increase. They also believed that the price of coal would go down; and, as a matter of fact, whereas the gross amount expended upon it in the present year was £5000, during the ensuing twelvemonth it would be about £2000 less. Therefore they had a very good future to look forward to. The increase in the consumption of gas in the past year had been rather less than 12 per cent. This was a very great advance; and it was due in a considerable degree to the use of gas in the daytime for cooking and heating purposes and by gas-engines. The amount of capital expended per ton of coal had decreased; for in 1882 it stood at £6 7s. 7d. per ton, while at the present time it was £4 17s. The make of gas per ton of coal was 10,824 cubic feet; and of this they had sold 10,352 feet. The leakage was 2¼ per cent., which was very little; the works were in good going order; and he thought everything was progressing satisfactorily. The Directors had been obliged to lay out a considerable amount on the extension of the river wall; and they had renewed the retort-benches. But they had saved the money with which to do it; and they had to take nothing out of the increase of the year for this purpose. The report was adopted; and the recommendation of the Directors that a dividend be declared, less income-tax, at the rate of 10¾ per cent. per annum was agreed to. Subsequently the Board were authorized by the shareholders to raise on mortgage a sum of £750, and a further sum of £1080; making together £1830.

During the past half year the Scarborough Gas Company have had a very satisfactory increase in their business. The revenue account shows a profit of £5185; while the net revenue (including £1897 brought from the last account, and after deducting all interest charges for the half year) is £6579. Out of this sum, after providing for the dividend on the 5 per cent. preference stock, the Directors recommend the payment of the statutory dividends. The payment of these will absorb £5141 11s. 5d.; and leave a balance of £1437 8s. 0d. to be carried to the next half year. The Directors remarked in their report that, notwithstanding the increased cost of coal, as compared with the corresponding six months of 1890, they were able, on April 1 last, to withdraw the advance of 3d. per 1000 cubic feet made on July 1, 1890; and, as the new contracts for coal have been entered into on more favourable terms, they hope, with a continued growth in the consumption of gas, to maintain the reduction. The price of coke remains unaltered; but the contracts for the sale of tar and ammoniacal liquor have been renewed at lower rates. The number of cookers at present on hire exceeds 500—which are in addition to many purchased by consumers—and the consumption of gas for other purposes than lighting has been greatly increased. The Directors add that under the contract for the current year, they have reduced the price of gas for public lighting to 2s. 6d. per 1000 cubic feet. The number of lamps in use is now 1265, about 10 per cent. of which are of high power.

The Directors of the Wakefield Gaslight Company report that, as a result of the half-year's operations, they have a balance available for dividend of £6409, out of which they recommend the payment of the following dividends, clear of income-tax—11½ per cent. on the old shares, 9 per cent. on the £5 "B" five-fifths, and 8½ per cent. on the new £10 shares.

The total receipts of the Westhoughton Gas Company for the past half year amounted to £1434; and the aggregate expenditure was £934—leaving a balance of £499 to be carried to the profit and loss account. At the recent meeting of the shareholders, a dividend at the rate of 5 per cent. was declared; and in the course of the proceedings, it was mentioned that the Company are now constructing a new holder, which will have a capacity of about 200,000 cubic feet.

Water Companies.

The accounts of the Chester Water Company for the past half year show a surplus of revenue over expenditure of £2425, which, with the balance from the preceding half year (£2802) amounts to £5227. The interest on preference capital requires £450; leaving a balance of £4777, which is to be appropriated to the payment of a dividend at the rate of 7½ per cent. per annum, free of income-tax, upon the consolidated stock, and of 7 per cent. per annum upon the new ordinary stock, 1874, amounting to £1890, and carrying forward £2886.

At the half-yearly meeting of the Cleveland Water Company last Tuesday, dividends were declared at the rate of 6 per cent. per annum on the original and "A" shares and £4 4s. per cent. on the "B" shares, free of income-tax. This will absorb £1872 of the disposable balance of £2447, and leave £575 to be carried forward—£240 to the contingent fund, and the balance, £335 9s., to the credit of the next half-year's accounts.

The Directors of the South Staffordshire Water-Works Company report that during the past half year the number of houses laid on was 1428; making the total supplied 73,700. The gross amount of water-rates for the six months was £37,165, as against £36,244 in the corresponding period of the previous year. After providing for interest on debenture stock and preference stock, the amount remaining for division (including £2618, the balance brought forward) is £17,281; and the Directors recommend the declaration of a dividend for the half year on the ordinary stock at the rate of 5½ per cent. per annum, less income-tax. The amount of this dividend being £14,187, there will remain £3094 for the credit of next half year.

The accounts of the Wrexham Water-Works Company for the year ending June 30 last show that the concern continues to make steady progress. The expenditure on capital account during the year amounted to £5704, and includes payments on account of new offices, extensions of mains, and for works in connection with the increase of the Company's sources of supply; the capital required having been raised by the issue of 800 "C" 4 per cent. preference shares. The receipts upon water accounts show an increase of £456 as compared with the preceding year. After the payment of the usual charges, the dividends upon the preference shares and stock, the interim dividend of 5 per cent. for the half year ending December, 1890, and interest upon mortgages for the year, a balance remains upon net revenue account of £3412. The Directors accordingly recommend the declaration of the second half-year's dividends, at the rates of 4, 4½, 5, and 5½ per cent. per annum upon the various classes of shares.

According to the report of the Directors of the Yeadon Water Company, the revenue for the past six months amounts to £929; and the net profit to £352, which will allow a dividend at the rate of 3 per cent. per annum on the original stock and £2 2s. per cent. on the "B" stock.

New Water-Works at Ballincollig, Cork.—It is proposed to construct water-works at Ballincollig, Cork, at an estimated cost of £5500, to supply the inhabitants of that town with wholesome water. The plans for the proposed works have been already prepared.

New Gasholder for the Newcastle and Gateshead Gas Company.—The Whessoe Foundry Company, Limited, of Darlington, have secured the contract for the iron and steel work for the new gasholder for the Newcastle and Gateshead Gas Company at their Redheugh works. This gasholder will have a capacity of about 3 million cubic feet, and will, it is believed, be the largest in the North of England. The Whessoe Company are adapting their works for the manufacture of gas plant, in addition to the general engineering business at present carried on.

The Water Supply of Pudsey, Calverley, and Farsley.—It is reported that the Calverley District Water Company, at a meeting of the shareholders last Tuesday, agreed to sell their plant and undertaking to the Pudsey, Farsley, and Calverley Local Boards for the sum of £13,000, the Boards to take possession on Jan. 1 next. The offer has been provisionally accepted. The Company has been established for upwards of twenty-six years; and has a capital of £20,000 in 4000 shares of £5 each, of which £3 per share was paid up. The Company purchased water from the Bradford Corporation under lease, and distributed it in the above-named townships. Up to eight or nine years ago Idle was included in the area of the Company's distribution; but as the result of arbitration, the Local Board of that township purchased the Company's rights in their district. The second lease of fourteen years from the Bradford Corporation to the Company would have expired in 1893; and the Corporation had agreed to renew the lease only with the Local Boards named.

Proposed Improvement of the Launceston Water Supply.—Mr. R. H. Worth, having been consulted by the Launceston Town Council with reference to the water supply of the borough, has sent in his report, which was read at the last meeting of the Corporation. To ensure the equal and uniform distribution of the water at present available, he recommended the construction of service reservoirs at Race Hill and St. Stephens, and various alterations in the distribution system; and he also advised that the mains and valves should be inspected at night, in order to detect the leaky ones. Having pointed out that, to meet the requirements of the Local Government Board, all calculations in regard to the provision of a storeage reservoir must be made on a supposed population of 5320, he said that for ninety days in each year the high-level supply was only equal to 19,000 gallons per day, and the low-level supply to 21,000 gallons. A population of 5320 required, at the rate of 20 gallons per head, 106,400 gallons per day; and the deficiency was, therefore, 66,400 gallons, which had to be provided for. For the 90 days, when this deficiency occurred, a reservoir was required of at least 5,976,000 gallons, or (say) six million gallons. This reservoir would have to be on the high level, as the low-level supply was useless for the purpose. The site at Trethorne was not well adapted for such a reservoir. At Tregadillet a reservoir would have to be "made" in the full sense of the word at an estimated cost of more than £6000; and such a reservoir, though not perhaps an engineering impossibility, would be at least a strong improbability. He was, therefore, reluctantly brought to report that the present system could not be made to supply an efficient storeage; and less than an efficient and ample storeage would involve a waste of all money expended on it. From an engineering point of view, it was his duty to advise that the adoption of a fresh supply would be the truest economy. There was an hourly waste in the district under the present system of 2335 gallons; he recommended that the Council should at once take steps by means of night inspection to stop the waste. After some discussion, it was resolved that immediate action should be taken to prevent the waste of water; and that a further meeting should be held to consider the other portions of the report.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

The Inverness gas undertaking, under the management of Mr. Thompson, shows a good record year by year. His report for the past year, submitted to a meeting of the Police Commissioners on Monday last, stated that the quantity of coal carbonized was 5068 tons; that the output of gas was 46,645,000 cubic feet; that the quantity of gas sold (41,590,000 cubic feet) was 10 per cent. more than in the previous year; and that the leakage had been reduced from 12½ to 10 per cent. The Commissioners, contrary to Mr. Thompson's advice, did not raise the price of gas last year; and the result has been a considerable deficit, as might have been expected. Profiting by experience, and acting upon Mr. Thompson's suggestion, they have this year raised the charge from 4s. 2d. to 4s. 7d. per 1000 cubic feet. Another question dealt with in the Manager's report was the necessity for enlarging the gas-works. When the Commissioners took over the undertaking in 1875, the output of gas was 16 million cubic feet; now it is nearly 47 millions, or almost three times the then output. The consequence is that there is not sufficient storeage, the purifiers are overworked, and some of the mains, not having been enlarged for 40 years, are too small. The Manager recommended, to put the works on a satisfactory footing, the expenditure of £9600, made up of £2980 upon a cast-iron gasholder-tank; £4100 upon the holder; £900 upon valves and connections; £1200 upon four purifiers; and 300 upon mains. Mr. Thompson was instructed to prepare plans of what he proposed, and to report upon the estimated cost. At the meeting of the Commissioners, some of their number suggested that, before they went in for so large an expenditure upon the gas-works, they ought to consider whether the electric light could not be introduced. This is the old bogey which has been raised in so many places, against the improvement of the gas-works; and it is probably of no more account in Inverness than it has been elsewhere, but it may trouble them as much as it has done many others. The proposal is to utilize the River Ness for the driving of dynamos. Now, the river is a very fine one; and it might be capable, as the speaker said, of providing electric light for the whole of the North of Scotland. No one who has seen the rapidly flowing Ness will doubt its serviceable disposition, when left alone. But there is such a thing as frost in the Highlands—usually at times when the nights are longest and darkest—and I, for one, would not venture to say that, if the Ness were subjected to an embrace by King Frost to the extent of (say) 20°, it might not give the electric lighting plant a rest, and that, too, at a time when it would be most wanted. What would "the whole of the North of Scotland" then do for light? How many curses—in Gaelic—would be muttered at "the lazy beast of a river?" Really, I must say, the proposition exposes the river, of which Invernessians are so justly proud, to the risk of having its reputation marred to an extent which, I am sure, they would not like to contemplate, far less experience. It would be bad enough if Inverness itself were deprived of light for a week or a fortnight; but the local community might be disposed to bear with the affliction, out of a sense of past favours. The worst that would befall them would be that the expenditure upon the gas-works would have to be incurred after all; and the community would thus have to bear two outlays instead of the one which is proposed by the Gas Manager.

Mr. John Evelyn-Liardet, of London, whom I mentioned in my last week's "Notes" as having visited Aberdeen with a view to inducing the Corporation to embark on a water-power system of electric lighting, has now returned south. It is reported to-day that "Mr. Smith, the Gas Manager, has made calculations with reference to the volume of water in the Dee; and these have been forwarded to Mr. Liardet. Apart, however, from other questions which might arise, there are legal difficulties connected with the utilization of the water in the river for the purpose proposed, which, it is considered, would be fatal to any practical experiments with the scheme." This I take to mean that the Corporation are not to be induced to adopt Mr. Evelyn-Liardet's proposals, and that they wish to let him down gently.

The Forfar Gas Corporation have closed another year, which has not been quite satisfactory. The town seems to be decaying at a rapid rate. In the year 1889-90 they had a surplus of £234; last year they had a deficit of £69. It must be admitted, however, that the Corporation manage their undertaking in quite a business way, and that they, or their Manager, are in no way responsible for the loss. They continued the price of gas during the past year at 4s. 1d. per 1000 cubic feet, at which it was in the previous year, and this notwithstanding that the price of coal had advanced from 17s. to 20s. 8d. per ton. In their estimates for the current year, they propose to charge 4s. 4d. per 1000 cubic feet; and they expect a revenue of £5988, and an expenditure of £5876, which would leave a surplus of £112, or, deducting last year's deficit, about £43. They estimate a revenue of £5218 from gas, and of £770 from residuals; and an expenditure of £3000 upon coal, which is again an advance upon the sum which was contracted for last year.

One of the new joint-stock companies registered in Edinburgh this week is that of the Cowdenbeath Gas Company, with its head office in West Regent Street, Glasgow. The Company is to have a capital of £2000, divided into £10 shares, and its objects are to supply the town of Cowdenbeath with oil gas, or other illuminant.

It is worth recording that the Dalkeith Police Commissioners, after a sputter of discontent and the inevitable proposal to take over the gas undertaking, have just arrived at the conclusion that they have been well treated by the local Company. This auspicious resolution has been come to coincidently with the conclusion of negotiations for the revision of the charge for gas consumed in the public lamps. Under the new arrangement, the Commissioners are to pay the same price as ordinary consumers—4s. 7d. per 1000 cubic feet—less 10 per cent. discount, and are to increase the number of meters from 8 to 16 upon 330 lamps.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

At last Thursday's meeting of the Town Council of Glasgow, there were submitted the minutes of the Gas and Electric Lighting Committee, in which were included, as the most important items, the

Committee's recommendation regarding the proposed new gasholder of very great capacity, and their annual report and statement of accounts. These matters were dealt with in the last issue of the JOURNAL; but the following may be quoted from the minutes in respect of the new holder: "The Special Sub-Committee on Additional Accommodation for Storeage of Gas have now to recommend that a new gasholder, capable of containing from 5 to 6 million cubic feet of gas, be erected upon a portion of the ground recently taken over by the Corporation from the Partick, Hillhead, and Maryhill Gas Company, Limited. The plans of the tank for the gasholder have been considered and approved of by the Special Sub-Committee; and the probable cost, both of the gasholder and tank, is estimated at £50,000. In connection with this proposal, and also in view of additional gasholders being hereafter put down upon the remaining ground, it will be necessary that the Corporation should acquire the minerals in about 8½ acres of land; and negotiations for the purchase of these minerals have for some time past been carried on by the Special Sub-Committee. It is believed that the rights and interests of the landlords and the tenants of these minerals can be acquired for a sum not exceeding £3000; and the Special Sub-Committee have accordingly now to ask authority to complete the purchase of the same at the price indicated." In moving the adoption of the minutes and the recommendation as to the proposed new gasholder, the Convener of the Works Sub-Committee (ex-Bailie Ure) remarked that additional storeage accommodation had become an absolute necessity, owing to the largely increased demand for gas, as well as to the inadequate storeage accommodation existing for some years past. This matter would, he remarked, have been taken in hand by the Corporation some time ago, but for the fact that the negotiations were going on with the Partick, Hillhead, and Maryhill Gas Company, whose ground at Maryhill was most suitable for the new holders contemplated by the Gas Committee. The Convener of the Finance Sub-Committee (ex-Bailie M'Laren) seconded the motion for the adoption of the minutes; and in that capacity he also asked approval of the annual accounts. In doing so, he enlarged upon the financial statement, and made an interesting analysis of it, dwelling largely upon those items of expenditure in which there had been a material increase during the year, as compared with corresponding items in the accounts for 1889-90. There was, he said, a total increase of £104,217 in respect of the manufacture of gas, which was made up thus: Cost of coal, £66,269; purifying materials, £1712; wages, £16,120; repairs, £18,441; carting, £1675. But apart from the increased quantity of coal carbonized during the year—379,130 tons, being an increase of 60,000 tons—the cost of coal had been greatly enhanced by the strike of the railway employees, which could not be put into figures. A large proportion of the increase in wages was due to the eight-hour shift conceded 18 months ago, which had told on the expenditure during the whole of the past year. The destruction of the gasholders at Dawsholm had added to the expenditure for repairs upwards of £7000, besides causing great inconvenience. Bailie M'Laren then showed the increased expenditure in another form. During the year 1889-90, the average price per ton of coal carbonized was 9s. 11·02d., as compared with 11s. 10·21d. per ton in the past year; giving an increase of 1s. 11·19d. per ton over the cost in the previous year, in addition to which the yield of gas per ton of coal was 320 cubic feet less. In the wages account he also showed that there was an increase of 1·731d. per ton of coal carbonized—from 3s. 9·943d. in 1889-90 to 3s. 11·674d. in the year 1890-91. The cost of coal per 1000 cubic feet of gas made during last year was 15·367d. as against 12·431d. in the preceding year—an advance of 2·936d. The rise in revenue, though not equal to that in expenditure, had been most satisfactory. The increase from gas was £45,597; and from residuals, £20,398—giving a total of £65,995. In the course of some other comparisons, the Convener of the Finance Committee showed that the increase in revenne since the gas supply came into the hands of the Corporation in 1869 had risen 105 per cent.—from £255,701 to £483,576—and yet the price of the gas had decreased from 4s. 7d. to 2s. 6d. per 1000 cubic feet. He concluded by saying that the addition of the works of the Partick, Hillhead, and Maryhill Gas Company, and of the Pollokshaws Gas Company would necessitate an increase of capital to the extent of 25 per cent.; but, on the other hand, it was hoped that the increased revenue from those Companies' districts would compensate for the extra expenditure. The minutes were agreed to.

It was stated in the course of the proceedings of the same meeting, that the Electric Lighting Sub-Committee had encountered some difficulty in proceeding with their work—to such an extent, indeed, that their Convener announced that they had resolved on again consulting Sir W. Thomson on some important points. This circumstance warranted them in asking Mr. Colquhoun to defer submitting a motion of which he had given notice, to the effect that the Committee be asked to reconsider the question of adopting the low-tension system of electric lighting in the city. He readily agreed to postpone his motion.

From what has lately transpired in connection with the purchase of the Partick, Hillhead, and Maryhill Gas Company's works and undertaking by the Glasgow Corporation, it is stated that the debenture holders will fare very much better in the "division of the spoil" (£205,000 odd) derived from the sale of the works, &c., than the ordinary or even the preference shareholders. I am told that three of the principal holders of the Company's debentures were the late Mr. John Walker, Mr. G. B. Wieland, and Sir C. Tennant, Bart.—all of the North British Railway Company, and respectively General Manager, Secretary, and Director.

Following the acquisition of these works by the Glasgow Gas Commissioners, there has been quite a commotion caused in the suburban burgh of Partick, which is one of three burghs conterminous with that of Glasgow which have declined to be taken into the "Second City of the Empire" by the Municipal Extension Act which will come into operation next November. Already the works of the Partick, Hillhead, and Maryhill Gas Company are in the possession of the Glasgow Gas Commissioners, who have given decided indication of their ownership by sending notices to the Partick gas consumers, demanding sums of 10s. and upwards as deposits to guarantee the due payment of the gas accounts—this deposit to be paid within seven days, failing which the gas is liable to be cut off. There is some heart-burning in store in connection with this annexation question, coupled with the purchase of the surburban gas-works. I may remark, in passing, that Glasgow gas has all along been supplied to large numbers of Partick residents on the same terms as those that have ruled within Glasgow proper. In this connection, the questions of "reasonable security" for payment of the gas accounts, as they became due, as given in Sheriff Guthrie's "opinion," which appeared in the last issue of the JOURNAL (p. 270), has acquired a considerable amount of interest. The statement of the learned Judge on the subject has been read by a large number of persons who have since seen it in the local press.

In Scotch pig-iron warrants, little business has been done this week. The price has fluctuated between 47s. 1d. and 45s. 5½d. per ton cash; the close yesterday afternoon being 47s. 4d. More business has been done in Cleveland and hematite iron; the prices being considerably firmer than they were last week. The former touched 40s. 7½d. per ton cash last Tuesday, and closed again somewhat easier yesterday, with seller. at 39s. 5d. The fluctuations in hematite iron during the week ranged between 48s. cash and 48s. 4d. yesterday, sellers. Business in general still continues quiet; and consumers all over seem to be buying from "hand to hand."

The Glasgow and Lanarkshire coal trade is pretty active at presents The miners are working away steadily; and there is little prospect of wages being reduced. Indeed, some of the masters on 'Change were saying that in a month or so values may be raised. At any rate sellers were firm in their ideas this week; splint realizing 8s. 9d. to 9s. per ton; main, 7s. 10d. to 8s.; steam, 10s. to 10s. 9d.; and ell, 8s. 9d. to 9s. 3d.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 15.

Sulphate of Ammonia.—The market is assuming a stronger tone, and £10 16s. 3d. to £10 17s. 6d. may now be said to be the spot quotation, while there are buyers of forward contracts at £11 2s. 6d. to £11 5s. per ton. In view of the present price of nitrate of soda (9s. per cwt.), sulphate may be considered the cheaper commodity, and therefore a further advance of the latter is probable, especially as nitrate for future delivery is quoted at 9s. 3d. to 9s. 6d. There has been a fair inquiry from Continental consumers for present and forward delivery; and it is anticipated that this demand will be considerably enhanced during the next few months.

LONDON, *Aug.* 15.

Tar Products.—There has been more activity in this market during the past week, and benzols, particularly, are considerably firmer; business having been done at 4s. 4d. for 90's, and 2s. 11d. for 50's. Pitch also continues firm, and close upon to-day's price is available for delivery to the end of June, and even to December of next year. Anthracene is perhaps a shade weaker; but nominally the figures are as those of last week. To-day's prices may be taken as follows: Tar, 24s. to 29s. Pitch, 34s. 6d. Benzol, 90 per cent., 4s. 4d.; 50 per cent., 2s. 11d. Toluol, 1s. 8d. Solvent naphtha, 1s. 3½d. Crude naphtha, 1s. 2d. Creosote, 1¾d. Carbolic crystals, 6d.; crude, 60's, 1s. 4d. Cresol, 8d. Anthracene, "A" quality, 1s. 4d.; "B" quality, 11d.

Sulphate of Ammonia.—The firm feeling in this product continues; and £10 15s. is readily obtained for prompt and forward business. With nitrate prospectively dearer, owing to the reduced output, and the threatened tax to assist towards the war expenses, sulphate will probably materially benefit, and higher prices may reasonably be looked for. To-day's price may be taken as £10 15s. to £11. Gas liquor is quoted at 4s. to 5s.

Gas Exhibition and Cookery Lectures at Portsmouth.—A very successful exhibition of gas appliances was opened on Tuesday last, at the Albert Hall, Portsmouth, under the auspices of the Portsea Island Gas Company. Messrs. T. Fletcher and Co. showed a large assortment of stoves and gas-fires, all of the newest patterns. Miss Agnes Kelman lectured twice daily during the week to crowded audiences, who seemed to appreciate highly the information given on the subject of cooking by gas.

Artesian Wells at Bournemouth.—The Bournemouth Gas and Water Company have recently had a series of five Abyssinian tube-wells put down for them at the Tuckton pumping-station by Messrs. Legrand and Sutcliff, of London. In order to test the yield of these wells exhaustively, the pumping-engine was kept going continuously day and night for seven days, with the result that a supply of upwards of 500,000 gallons of water per day was obtained, and this only temporarily lowered the head of water 7 feet.

Extensions at the Carnforth Gas-Works.—Owing to the increased consumption of gas in the district of the Carnforth Gas Company, the Directors have decided to put up new generator furnaces, a condenser, a scrubber 40 feet high and 5 feet in diameter, four purifiers 10 ft. in diameter and 4 feet 6 inches deep, a gasholder 70 feet in diameter and 20 feet deep, and a gas-engine for working the exhauster. The contracts for the furnaces, condenser, scrubber, and engine have been accepted, and the work (which will be supervised by the Manager, Mr. H. Lawton) is fully in hand. The purifiers and holder are to be erected in the early part of next year. The Company have lately held their annual meeting, when a dividend of 10 per cent. was declared.

Gas Exhibition at Ascot.—An interesting exhibition of gas heating and cooking stoves and domestic labour-saving appliances was held in the Grand Stand on the Ascot Racecourse on Wednesday, Thursday, and Friday last week. They were exhibited by Messrs. T. Fletcher and Co.; and most interesting lectures on cooking by gas were delivered by Miss Edden. The hall was most beautifully lighted by "Meteor" lamps supplied by Messrs. H. Greene and Sons; and some Deimel lamps were shown by the Deimel Lamp Company. The Exhibition was opened by the Chairman of the Company (Mr. R. Barridge). All the arrangements were made by Mr. W. G. Hicks, the Company's Manager; and altogether the exhibition proved a great success.

THE LANCASHIRE GAS COAL TRADE.

From Our Own Correspondent.

There are now very few contracts for gas coal that have yet to be settled; and these can have no appreciable effect upon the general run of prices. In summing up the results of the gas coal season, it may be stated generally that, in the best descriptions of coal, contracts have, as a rule, been placed at a reduction of 6d. per ton upon last season's prices; while in seconds and lower qualities the reduction has been about 10d. to 1s. per ton. With regard to the average prices which have been paid upon gas coals, these have ranged from 9s. 3d. to 9s. 9d. for inferior and second qualities, up to 10s. and 10s. 6d., and in some instances 11s. per ton for the very best kinds of gas coal at the pit's mouth. With regard to cannel, although the season opened, as I have already reported, with a very general hardening-up of prices, the advanced rates which colliery proprietors have been asking have scarcely been maintained all through; and this may be accounted for by the now general tendency on the part of gas companies to use ordinary gas coals in the place of high-priced cannel. A feature in connection with the business done during the past season, and to which I have referred in previous reports, is that, with very few exceptions, the contracts placed by gas companies and corporations have been confined to twelve months' requirements; and even where tenders have been offered for two and three years, companies have declined to entertain more than twelve months' deliveries. This policy has, no doubt, been considerably influenced by anticipations that next year users of gas coal may be able to buy on even more favourable terms than have been conceded during the past season. But in well-informed quarters it is regarded as very doubtful whether the prices in 1892 will be lower, to any appreciable extent, than those which have been accepted during the last few months. Colliery proprietors have no doubt conceded to consumers as much as they can on the basis of the present rate of wages; and unless they are able to secure some reduction in wages, it is doubtful if they will be at all willing to give way further to any material degree. Even in the event of a mild season during the ensuing winter, any noteworthy weakening in prices is regarded as improbable; the miners for the present having practically complete command of the situation. During the summer they have followed out persistently a policy of preventing the accumulation of any large stocks; and there is every probability that, in most cases, colliery proprietors will commence the winter with much less than their usual supplies. So that this of itself would counterbalance any lessened demand which might arise from an exceptionally mild winter. Of course, there are other considerations which must come into operation that will largely affect the outlook in the coal trade; and amongst these the general slackening off in many coal-using branches of industry cannot be lost sight of. This has already had its effect upon the contracts which have been placed for locomotive coal, and for other classes of fuel which are very largely employed for manufacturing purposes; but, as already stated, until some material reduction can be brought about in wages (and this will not be accomplished without a severe struggle between the colliery-owners and the men), any further material giving way in prices beyond those which have already taken place can scarcely be looked for.

With respect to the general condition of the coal trade, apart from gas-making descriptions, a steady tone is being maintained at current rates, except in some of the inferior descriptions of fuel. The better qualities of round coal, suitable for house-fire purposes especially, are remarkably firm in price. Although stocks are accumulating, it is only in exceptional cases that any very large quantities are being put down; while the demand, owing to the unseasonable character of the summer, has been considerably above the average. At the pit's mouth, best Wigan Arley coals are quoted at 12s. to 12s. 6d. per ton; second qualities, 10s. 6d. to 11s.; Pemberton 4-feet, 10s. to 10s. 6d.; and common house-fire coals, 9s. to 9s. 6d. per ton. The continued only moderate demand for iron-making, steam, and other manufacturing purposes naturally causes the lower descriptions of round coal to be more plentiful in the market; but as far as inland sales are concerned, prices do not give way to any really quotable degree, although here and there some little easing-down is necessary to meet competition from outside districts. At the pit's mouth, ordinary steam and forge coals for inland requirements can scarcely be bought at less than 7s. 6d. to 8s. per ton, with some descriptions firm at quite 3d. above these figures. Surplus supplies, however, are being pushed for shipment at very low rates, especially in inferior steam coals; these being offered freely for delivery at the High Level, Liverpool, or the Garston Docks at about 9s. per ton, although better sorts are still fetching 9s. 6d. to 10s. per ton. The depression in the cotton trade and in the salt and chemical industries operates to very seriously affect the demand for engine classes of fuel; and although the better sorts of burgy and slack move off moderately well at about late rates, common descriptions of slack continue a general drug in the market, with excessive supplies not only from Lancashire collieries but from other districts, and sales are pushed at almost any price that can be secured. Good ordinary qualities of burgy are averaging about 6s. 6d. to 7s. per ton; the better qualities of slack, 5s. 9d. to 6s. 3d. Common sorts, however, are offered freely at from 3s. to 4s. per ton at the pit's mouth.

Northern Coal Trade.—There has been an increased demand for some classes of coals in the past few days; and the markets of the North have, on the whole, retained their strength. Best Northumberland steam coals are steady, but with a less urgent demand, at from 12s. 3d. to 12s. 6d. per ton free on board. Small coals are dull at about 4s. 3d.; the consumption being lessened by the number of idle steamships. For gas coals, the inquiry grows steadily, both for export and for local use; and the largest of the gas-coal producing firms have raised their price for cargoes to 10s. per ton. A local contract concluded for 20,000 tons, at about 9s. 6d. per ton, defines the manner in which best Durham gas coals are contracted for just now. The consumption grows more like the average rate, and will increase for months to come. Coke is steady, with more demand for Spain, it being relatively cheaper to send out coke than coal to coke. There is no alteration in gas coke this week.

Electric Lighting at Larne.—The seaport of Larne, well known in connection with the Larne and Stranraer route to the North of Ireland, has been lighted by electricity.

The Proposed Purchase of the Accrington Gas-Works by the Corporation.—The report of the Committee appointed by the Accrington Town Council to negotiate with the Accrington Gas and Water Company, with a view to purchasing the Company's undertakings, have issued their report. It is said that the price asked by the Company is £932,750, which is estimated as something like 40 years' purchase of the statutory maximum dividends. The sum is regarded as too high and the general expectation is that the Town Council will refuse to entertain the purchase at this figure. The area supplied by the Company embraces four Local Board districts—Church, Clayton-le-Moors, Rishton, and Great Harwood—as well as the borough of Accrington and the townships of Altham, Huncoat, Henheads, and Lower Booths. Accrington, however, takes one-half of the supply. The authorized capital of the Company is £284,000.

Gas Affairs at Bolton.—At the last meeting of the Bolton Town Council, Alderman Miles, in moving the adoption of the minutes of the Gas and Lighting Committee, announced that the contracts for coal had been completed, and had resulted in the saving of 6d., 4d., and 3d. per ton on the different qualities. He then referred to the fact that the Committee had ordered three dozen prepayment meters; and mentioned that the meters now out were doing good service, and becoming popular. The Committee had had before them a report as to the gas consumed for other than lighting purposes; and it was of an interesting character. It showed that they had in the borough and district 81 gas-engines, varying from 2-men to 20-horse power, and consuming 6,164,000 cubic feet of gas per annum. There were 740 cooking-stoves and gas-fires on hire, and consuming 10,000,000 cubic feet per annum. There were 477 purchased boilers, grillers, and gas-fires, consuming 400,000 feet per annum; and a miscellaneous assortment of water boilers, &c., consuming 4,000,000 cubic feet per annum. In other words, the consumption of gas for other than lighting purposes was 20½ million cubic feet per annum—showing that these appliances were getting very popular; and as their use spread, they would prove an excellent source of revenue to the Committee. The minutes were adopted.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 298.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	10 Apl.	10½	Alliance & Dublin 10 p. c.	10	17—18	..	5 16 8
100,000	10	,,	7½	Do. 7 p. c.	10	11½—12½	..	6 0 0
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	104—106	..	4 14 2
100,000	20	28 May	8	Bahia, Limited	20	13—15	−1	10 13 4
200,000	5	13 May	7½	Bombay, Limited	5	6⅞—7	..	5 7 1
40,000	5	,,	7½	Do. New	4	4⅞—5⅛	..	5 14 1
380,000	Stck.	13 Aug.	12½	Brentford Consolidated	100	215-220*	+1	5 11 4
125,000	,,	,,	9½	Do. New	100	156-160*	+¾	5 15 7
220,000	20	12 Mar	11½	Brighton & Hove Original	20	40—42	..	5 9 6
320,000	20	10 Apl.	11½	British	20	44—46	..	4 17 10
50,000	10	12 Mar.	11	Bromley, Ordinary 10 p. c.	10	18—20	..	5 10 0
39,000	10	,,	8	Do. 7 p. c.	10	13—15	..	5 6 8
328,750	10	13 Nov.	6	Buenos Ayres (New) Limited	10	7—8	..	—
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	90—95	..	6 6 4
150,000	20	13 Aug.	8	Cagliari, Limited	20	24—26*	..	6 3 1
550,000	Stck.	10 Apl.	13⅜	Commercial, Old Stock	100	255—265	..	5 3 9
130,000	,,	,,	10⅝	Do. New do.	100	190—200	..	5 7 6
130,000	,,	26 June	4½	Do. 4½ p. c. Deb. do.	100	119—124	..	3 12 7
800,000	Stck.	11 June	10	Continental Union, Limited	100	225—235	..	4 5 1
200,000	,,	,,	7	Do. 7 p. c. Pref	100	190—200	..	3 10 0
75,000	Stck.	25 Mar.	10	Crystal Palace District	100	200—205	..	4 17 7
486,090	10	15 July	10	European, Limited	10	20—21	..	4 15 3
354,660	10	,,	10	Do. Partly paid	7½	14¼—15½	..	4 16 9
5,470,640	Stck.	13 Aug.	13	Gaslight & Coke, A, Ordinary	100	234-238*	+2	5 9 3
100,300	,,	,,	4	Do. B, 4 p. c. max.	100	94—97*	..	4 2 5
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	254-259*	+1	3 17 3
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	118-123*	+½	4 1 4
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	172-177*	+½	4 4 9
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	159-164*	+1	4 5 4
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	250-255*	+1	3 18 5
476,000	,,	,,	—	Do. K, 6 p. c. Prf.	100	153-158*	+1	3 16 0
1,061,150	,,	11 June	4	Do. 4 p. c. Deb. Stk.	100	112—115	..	3 9 7
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	120—125	..	3 12 4
908,000	,,	,,	6	Do. 6 p. c. do	100	163—168	..	3 11 5
3,800,000	Stck.	13 May.	12	Imperial Continental	100	231—236	+2	5 1 9
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	5	4¼—4¾	..	6 6 4
560,000	100	1 Apl.	5	Met. of Melbourne, 5 p. c. Deb.	100	111—113	..	4 8 6
541,920	20	11 June	6¼	Monte Video, Limited	20	16—17	+⅛	7 12 11
150,000	5	28 May	10	Oriental, Limited	5	8¼—8½	+¼	5 14 3
60,000	5	25 Mar.	7	Ottoman, Limited	5	4⅝—5⅛	..	6 7 3
166,870	10	26 Feb.	2	Pará Limited	10	2½—3½	..	—
420,000	100	4 May	6	People's Gas of Chicago—1st Mtg. Bds.	100	92—97	..	6 3 9
500,000	100	1 June	16	2nd Do.	100	90—95	..	6 6 4
150,000	10	28 Apl.	10	San Paulo, Limited	10	13—15	..	6 13 4
500,000	Stck.	26 Feb	15½	South Metropolitan, A Stock	100	285—290	..	5 6 11
1,350,000	,,	,,	12	Do. B do.	100	235—245	−4½	4 17 11
166,500	,,	,,	13	Do. C do.	100	245—250	+1½	5 4 0
678,000	,,	26 June	5	Do. 5 p. c. Deb. Stk.	100	140—144	..	3 9 6
60,000	5	12 Mar.	11½	Tottenham & Edm'nton, Orig.	5	11—13	..	4 8 5
				WATER COMPANIES.				
729,281	Stck.	26 June	10	Chelsea, Ordinary	100	260—265	..	3 15 6
1,720,560	Stck.	10 Apl.	8	East London, Ordinary	100	208—213	−2	3 15 1
544,440	,,	26 June	4½	Do. 4½ p. c. Deb. Stk.	100	138—143	..	3 3 0
700,000	50	11 June	8	Grand Junction	50	106—110	..	3 12 9
708,000	Stck.	13 Aug.	10½	Kent	100	260-270*	+2½	3 17 10
1,043,800	100	26 June	9½	Lambeth, 10 p. c. max.	100	233—238	..	3 19 10
406,200	100	,,	7½	Do. 7½ p. c. max.	100	192—197	..	3 16 2
260,000	Stck.	25 Mar.	4	Do. 4 p. c. Deb. Stk.	100	118—123	..	3 5 0
500,000	100	13 Aug.	12½	New River, New Shares	100	341-346*	..	3 10 1
1,000,000	Stck.	30 July	4	Do. 4 p. c. Deb. Stk	100	123—126	..	3 3 6
902,300	Stck.	11 June	6½	S'thwk & V'xhall, 10 p. c. max.	100	164—169	..	3 16 11
126,300	100	,,	6½	Do. 7½ p. c. do.	100	160—165	..	3 18 9
1,155,066	Stck.	11 June	10	West Middlesex	100	250—255	..	3 18 5

* Ex div.

The Campbell Gas-Engine Company, Limited.—The annual meeting of the shareholders of this Company was held on the 29th ult., when the recommendation of the Directors to pay a dividend of 10 per cent. for the past year and carry forward a considerable balance was agreed to. Important extensions are now being carried out at the works, which will, we believe, make the Company the second largest gas-engine manufacturers in the country. The Company (whose head-quarters are in Halifax) have opened new London offices and show-rooms at 114, Tooley Street, London Bridge, where their business will, as before, be managed by Mr. D. B. Macbride.

Barnet District Gas and Water Company.—According to the half-yearly report and accounts of this Company, the business continues to progress satisfactorily. The income of the gas undertaking during the six months amounted to £7658, and the expenditure to £5172—a sum of £2486 remaining to be carried to the profit and loss account. The receipts of the water undertaking came to £7226; and the outlay to £2573—leaving a balance of £4652. The profit and loss account shows an available sum for distribution of £13,711, out of which the Directors recommend the declaration of a dividend, less income-tax, at the rate of 8 per cent. per annum on the "A" and "C" stocks, 7 per cent. on the "B" stock, and £5 12s. per cent. on the "D" (water) shares.

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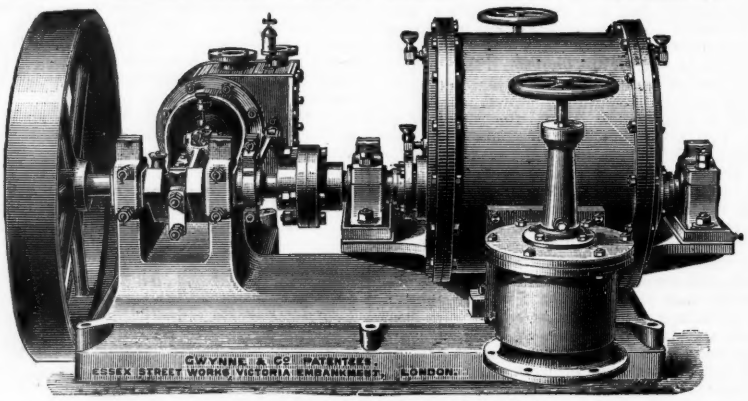

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*** See Advertisement p. 352 of this week's issue.

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WILLIAM DUNN,
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S. DAWES, Manager.

Gas-Works, Cleveland,
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Form of tender and conditions of contract may be obtained from Mr. Carr, Gas-Works, Widnes.
Tenders, endorsed "Tar," to be delivered to the undersigned, not later than the 29th inst.
The Board do not bind themselves to accept the highest or any tender.

H. S. OPPENHEIM,
Clerk.

Town Hall, Widnes,
Aug. 12, 1891.

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THE Corporation of Clitheroe invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR produced at their Gas-Works for One year from the 1st of September next.
Estimates of quantities and other particulars may be had on application to Mr. Miles, Manager, Gas-Works, Clitheroe.
Tenders are to be sent to the undersigned (at whose Offices conditions of contract can be obtained) not later than the 31st inst.
The Corporation do not bind themselves to accept the highest or any tender.

JOHN EASTHAM,
Town Clerk.

Clitheroe, Aug. 13, 1891.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

OXIDE OF IRON.

THE Gas Committee are prepared to receive TENDERS for the supply of 500 tons of OXIDE OF IRON for purifying the Gas at their Works.
Forms of tender and further particulars may be obtained on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.
Sealed tenders, endorsed "Oxide," to be sent to me not later than Three p.m., on Thursday, the 20th inst.

By order,
SAML. BROWN,
Town Clerk.

Town Hall, Salford,
Aug. 11, 1891.

HARTLEPOOL GAS AND WATER COMPANY.

TO GASHOLDER MAKERS.

THE Directors of the above Company are prepared to receive TENDERS for the several Works and Materials required in the construction and erection of a GASHOLDER, 150 feet in diameter and 30 feet deep, together with STANDARDS, GIRDERS, TIE RODS, &c, connected therewith, and the fitting and completion of the same at their Works at West Hartlepool.
Plans and specification may be seen, or any further information obtained, on application to the Company's Engineer, Mr. Thomas Bower, who, if desired, will supply copies of the plans and specification.
Tenders, on form prescribed, sealed, and endorsed "Tender for Gasholder," to be sent to Mr. Thomas Trewhitt, Secretary, Gas and Water Company, West Hartlepool, not later than Wednesday, the 2nd day of September next.
The Directors do not bind themselves to accept the lowest or any tender.

By order,
THOMAS TREWHITT,
Secretary.

Gas and Water Company's Offices,
West Hartlepool, Aug. 1, 1891.

TO TAR DISTILLERS.

THE Gas Committee of the Corporation of Blackpool are prepared to receive TENDERS for the surplus TAR produced during the next Twelve months from Sept. 1.
Sealed tenders to be sent in, addressed to the Chairman, by the 21st of August.
Particulars may be obtained from the undersigned at the Gas Office.

JOHN CHEW,
Gas Engineer.

Blackpool, Aug. 6, 1891.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Gloucester Gas light Company invite TENDERS for the surplus TAR produced at their Works for One, Two, or Three years, from the 1st day of October next.
The Tar will be delivered into Boats or Barges at the Company's Wharf, on the Gloucester and Berkeley Canal.
Offers to be at per ton of 200 gallons.
Payments, cash monthly.
Further particulars may be obtained on application to Mr. R. Morland, the Company's Engineer.
Sealed tenders, endorsed "Tender for Tar," and addressed to the Chairman, Gas Offices, Eastgate, Gloucester, to be delivered not later than Tuesday, the 25th day of August inst.
The Directors do not bind themselves to accept the highest or any tender.

By order,
WILLIAM E. VINSON,
Secretary.

Gas Offices, Gloucester, Aug. 6, 1891.

TO TAR DISTILLERS, ETC.

THE Directors of the Sheffield United Gaslight Company are prepared to receive TENDERS for the purchase of the surplus TAR made at their Neepsend and Effingham Street Works for the period of Twelve months, ending Aug. 31, 1892.
The quantities will be, approximately: Neepsend, 7000 tons; Effingham Street, 1500 tons.
At Neepsend the Tar will be loaded into tanks on the Company's Siding, on the Manchester, Sheffield, and Lincolnshire Railway, or into Barrel-Carts on the Works, and at Effingham Street, into Barrel-Carts only.
Forms of tender and conditions of contract may be obtained from the undersigned, to whom tenders, endorsed "Tender for Tar," must be delivered on or before Wednesday, Sept. 2.
The Directors do not bind themselves to accept the highest or any tender.

HANBURY THOMAS,
General Manager

Commercial Street, Sheffield,
Aug. 7, 1891.

SALE OF GAS COKE AND COKE BREEZE AT THE ROYAL ARSENAL, WOOLWICH.

THE Secretary of State for War is pre- pared to receive TENDERS for the purchase of such quantities of GAS COKE and COKE BREEZE as may be for disposal during the period of One year from the 1st of October, 1891, at the Royal Arsenal, Woolwich, where forms of tender and all information may be obtained, on application to the Superintendent of Building Works.
Parties tendering will be at liberty to submit offers for either the Coke or the Breeze, or for both, and are requested to make themselves acquainted with the mode of measurement at the Royal Gas Factory.
The tenders are to be delivered at the War Office, Pall Mall, S.W., by Twelve o'clock noon, on Wednesday, the 2nd day of September, 1891, addressed to the Director of Army Contracts, and marked on the outside "Tender for the Purchase of Coke and Breeze."

G. LAWSON,
Director of Army Contracts.

War Office, Pall Mall, S.W.,
Aug. 11, 1891.

C. & W. WALKER.

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ADDRESSES: 8, Finsbury Circus, London, E.C.; Midland Iron-Works, Donnington, near Newport, Shropshire.

"FORTRESS LONDON." "FORTRESS DONNINGTON."—Telegraphic.

BOROUGH OF BURTON-UPON-TRENT.

NEW TAR AND LIQUOR TANK.
CONTRACT No. 10.

THE Mayor, Aldermen, and Burgesses of the Borough of Burton-upon-Trent, acting by the Council, invite TENDERS from competent persons for the supply, construction, and fixing of a new CAST-IRON TAR AND AMMONIACAL LIQUOR TANK, and the execution of the works incidental thereto.

Full particulars and copies of conditions, specification, and bill of quantities, with form of tender, may be obtained and the drawings viewed, on payment of Two Pounds (which will be returned on receipt of a *bond fide* tender), on application to the Gas Engineer, Mr. F. L. Ramsden, Gas-Works, Burton-upon-Trent.

Sealed tenders, endorsed "Tar and Liquor Tank," are to be delivered to me at or before Ten a.m. on Saturday, the 29th of August inst.

The Council do not bind themselves to accept the lowest or any tender, nor will they pay any expense or charge relating to the making or delivery of the same.

T. N. WHITEHEAD,
Town Clerk.

Burton-upon-Trent,
Aug. 5, 1891.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is hereby given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the "Bell Hotel," Bromley, Kent, on Thursday, the 27th day of August inst., at Six o'clock precisely, to receive the Report of the Directors, the Balance-Sheet confirmed by the Auditors, to declare Dividends, and for General Business.

The Transfer Books will be closed from the 14th to the 27th of August, 1891, both days inclusive.

By order of the Board,
HENRY W. AMOS,
Secretary.

Offices at the Works, Bromley,
Kent, Aug. 12, 1891.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

TO THE PROPRIETORS.

NOTICE is hereby given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, No. 5, Great Winchester Street, London, on Friday, the 4th of September, 1891, at Two o'clock in the afternoon precisely, to receive the Report of the Directors and the accounts of the Company for the Half Year ending the 30th of June, 1891, to declare Dividends, to elect Auditors, and for other purposes.

The Transfer Books of the Company will be closed from the 21st of August, to the 4th of September, both days inclusive.

By order,
W. H. HARDY,
Secretary.

Offices: 5, Great Winchester Street,
London, E.C., Aug. 13, 1891.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is hereby given, that the ANNUAL ORDINARY GENERAL MEETING of the Proprietors in this Company will be held at the Offices, Willoughby Lane, Tottenham, on Saturday, the 29th day of August inst., at Three o'clock in the afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 30th of June last, to declare Dividend, for the election of two Directors and an Auditor for the ensuing year, and for General Business.

The Transfer Books for Consolidated Stocks will be closed from the 14th to the 31st of August inst., both days inclusive.

By order of the Board,
JAMES RANDALL,
Secretary.

Offices of the Company:
Willoughby Lane, Tottenham,
Aug. 14, 1891.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.

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Produce of Gas per ton - - - - - - - 10,500 feet.
" Coke " - - - - - - - 13½ cwt.
Illuminating Power - - - - - - - 16 candles.

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A GUIDE TO THE STUDY OF THE
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By William Joseph Dibdin, F.I.C., F.C.S.,
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AND OTHER PAPERS
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BY
F. SOUTHWELL CRIPPS, Assoc. M. Inst.C.E.

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They regulate from 6-10ths to 60-10ths, and give 3-10ths only at the burner. This fact, together with there being two tips, ensures the greatest possible amount of light from the gas consumed.

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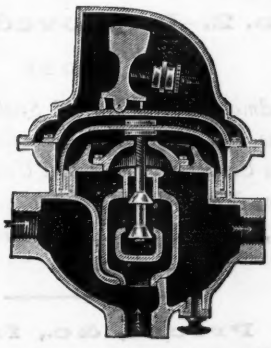

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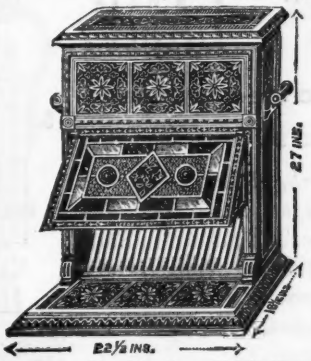

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Analysis: 12,600 feet of 19-candle gas per ton.

Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.

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Illuminating Power	38·22 candles
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Yield of Gas per ton	10,500 cub. ft.
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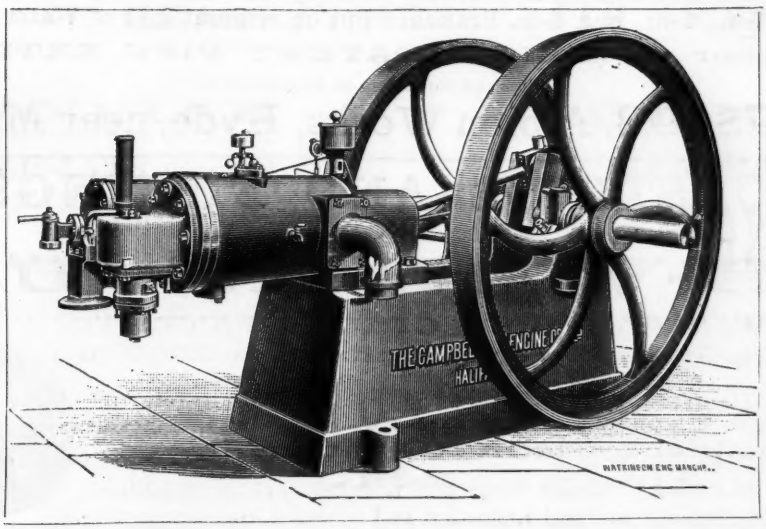

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Our Engines are used by Her Majesty's War Department; The South Metropolitan Gas Company, London, S.E. at the Sydenham Gas-Works; Tiverton Gas-Works; Filey Gas-Works, &c.

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FOR DRILLING AND TAPPING WATER-MAINS AND GAS-MAINS UNDER PRESSURE.

Patent Saddle Back and Drilling Apparatus, whereby Gas and Water Mains can have 2-in., 3-in., 4-in., 5-in., and 6-in. Branches put on without loss of Water or Gas.

Sole Maker of HELPS' PATENT PIPE EXTRACTOR.

Prices and Particulars on Application to

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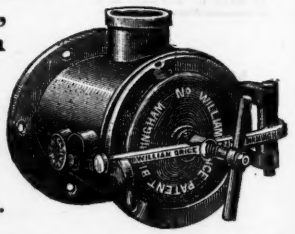

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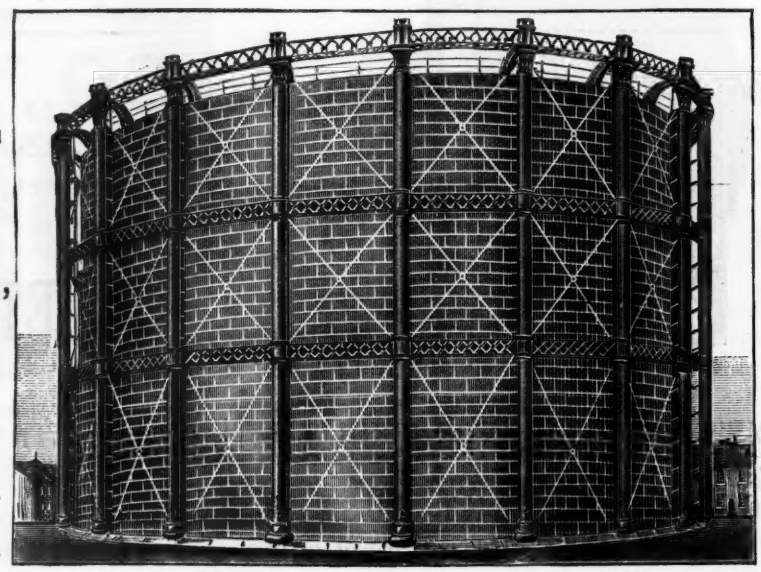

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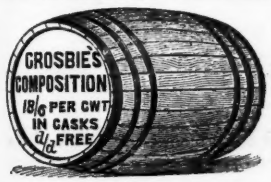

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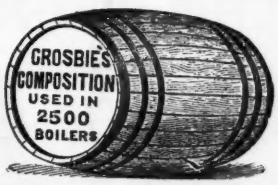

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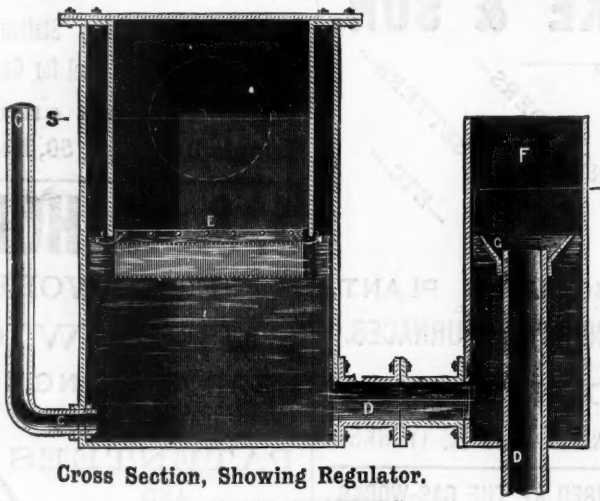

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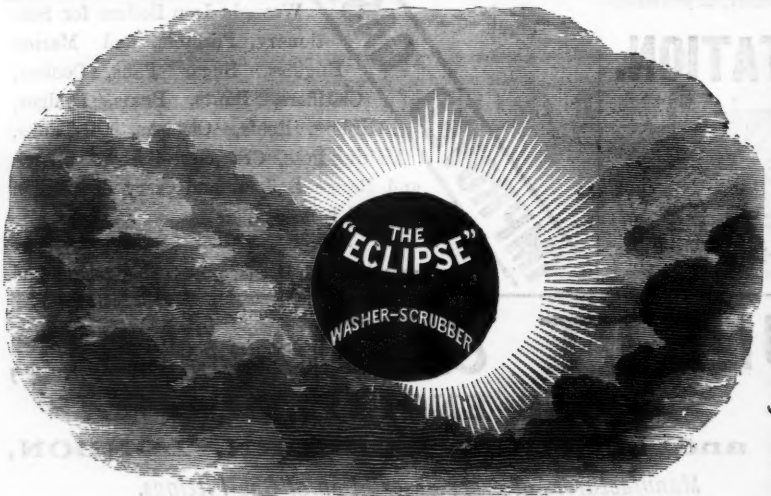

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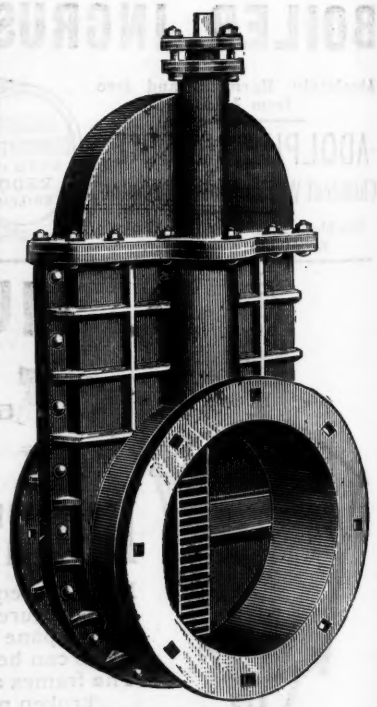

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